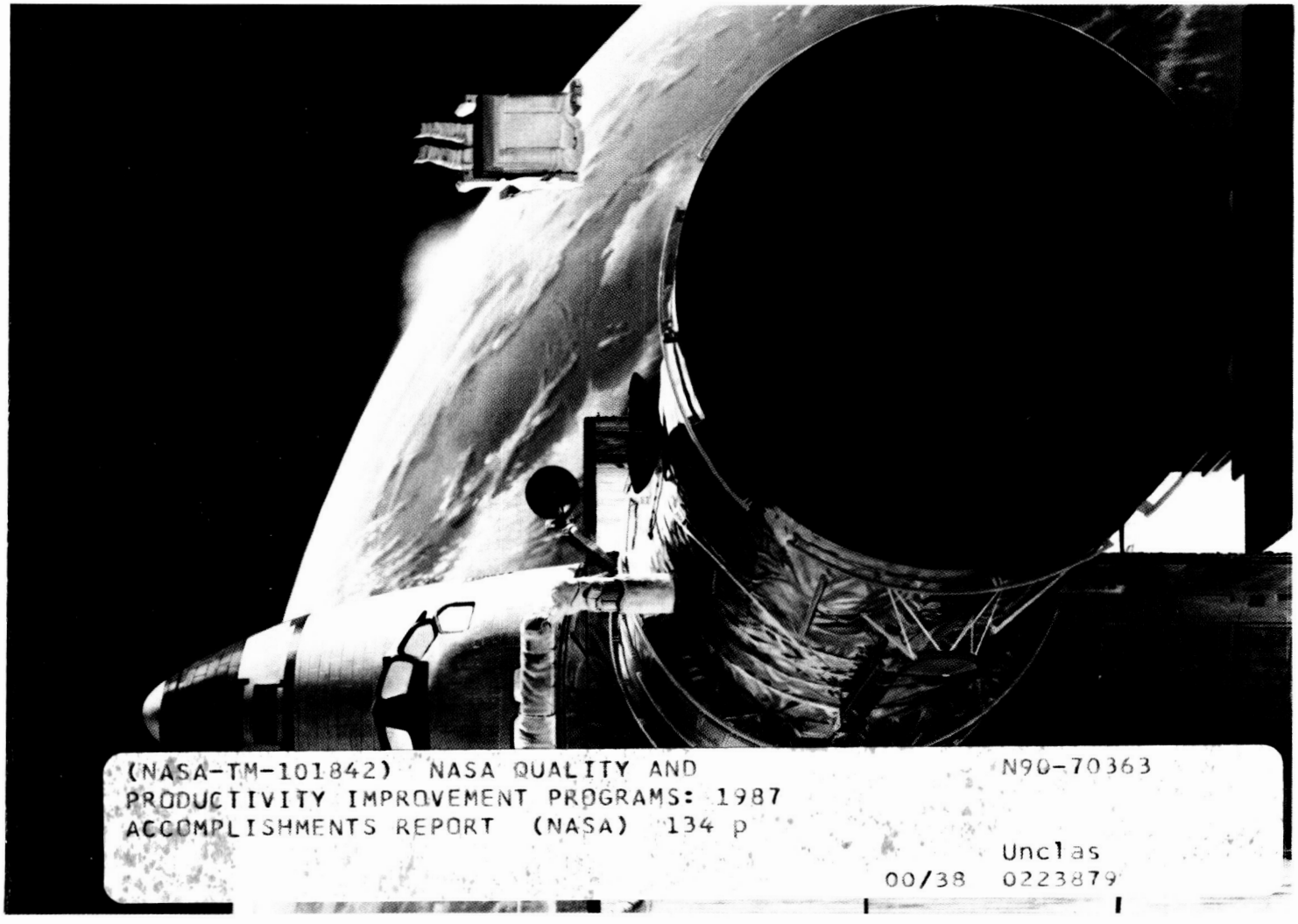
QUALITY AND PRODUCTIVITY IMPROVEMENT

1987 ACCOMPLISHMENTS REPORT



NASA TEAM QUALITY PRODUCTIVITY EXCELLENCE

NASA
National Aeronautics and Space Administration

July 1988

NASA QUALITY AND PRODUCTIVITY IMPROVEMENT PROGRAMS

1987 ACCOMPLISHMENTS REPORT

JULY 1988

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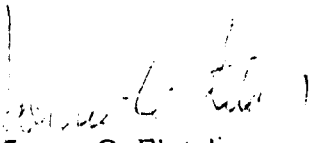
FOREWORD

This publication marks the fifth NASA Accomplishments Report. Since the conception of this document, significant strides have been made in quality and productivity improvement, both within NASA and within the contractor community. Although we still have a long way to go, we are taking a positive position by advocating quality and productivity efforts. We must continue to improve the quality of our goods and services and the productivity of our work force to successfully compete in the world market.

This report is a compilation of significant quality and productivity accomplishments for 1987. These achievements, coupled with many others, have resulted in savings of millions of dollars. It should be noted that many more accomplishments were submitted than were published. Those achievements that were not published are also important. All NASA quality and productivity initiatives reflect the enthusiasm and dedication of NASA's employees to the agency's goals and objectives.

NASA is very proud of the achievements of its employees and contractors in the quality and productivity arena. It is efforts such as these that demonstrate NASA's commitment to excellence and point the way for greater American competitiveness in the future.



James C. Fletcher
Administrator

PREFACE

Quality and productivity improvements, both those that provide tangible savings in terms of dollars and/or man hours and those that provide improved methods or processes, are necessary in meeting the goals and objectives required for successful competition in today's world. NASA has made significant progress in this area and we can take pride in our accomplishments.

The primary purpose of this report is to highlight qualitative and quantitative accomplishments that resulted in savings and improvements for 1987. Over 300 submissions were received for this fifth annual report on NASA's quality and productivity achievements. The process of narrowing the scope of the project down to a manageable number of entries was not an easy task. All the quality and productivity improvement efforts taken by NASA and its contractors help us to work more efficiently and effectively. Our goal was to generate a document that included a wide representation of NASA in each of the functional categories.

This publication is part of a continuing effort by NASA to disseminate quality and productivity improvement information to the aerospace community and to the public. In order to render a concise account of these efforts, the accomplishments have been organized into conceptual topics and edited to provide a summary account of each activity. A contact name and telephone number have been added to each entry. You are encouraged to use these contacts to obtain details on any of the accomplishments found in this report.

Joyce R. Jarrett

Joyce R. Jarrett
Director, Quality and Productivity
Improvement Programs

I. MANAGERIAL LEADERSHIP

1. Basic Operations Manual

Ames Research Center (ARC)

Description of the Activity:

Dryden Flight Research Facility has developed and published a document, the **Basic Operations Manual,** which defines policies that govern the way the facility does its flight research "business." The document includes the practices required from the conception of the program through its development process and into the operational phase.

Benefits Achieved:

Documenting the procedures under one title has improved communications both within the facility and with outside organizations. This has resulted in improved efficiency.

Contact for more information:

Name: Jack Kolf
Tel.: 805/258-3311

2. GSFC Quality/Productivity Excellence Award for GSFC Contractors

Goddard Space Flight Center (GSFC)

Description of the Activity:

The proposal to award the top Goddard contractor(s) for Quality and Productivity was approved in FY 1987. This award recognizes the top Goddard contractor(s) participating in the annual competition for the NASA Excellence Award.

Benefits Achieved:

This award is a vehicle for stimulating contractor participation in quality and productivity improvement programs and expanding the level of contractor recognition to include the Center as well as the agency.

Contact for more information:

Name: Glenn Fuller
Tel.: 301/286-6187

3. Technology Week Spinoff Showcase

Jet Propulsion Laboratory (JPL)

Description of the Activity:

One hundred and ninety small business development counselors from Southern California communities were invitied to a NASA/JPL "Spinoff Showcase" sponsored by the JPL Technology Utilization Office. Ten industry participants discussed application of JPL-developed technologies that have led to new, successful business ventures. These include (1) sun glasses and goggles that provide 95-98 percent reduction in ultra-violet rays; (2) a welding curtain that filters out harmful violet and blue rays; (3) a digital cytogenetic and karyotyping system; (4) a quartz crystal air particle analyzer for capture of particulate matter in clean rooms, hospitals, and science laboratories; (5) longer-life battery systems; (6) a slow-scan, two-way video telephone system; (7) applications of parallel computer technology; (8) applications of the NASTRAN computer program for structural analyses; (9) printed circuit board applications for use in training new employees; and (10) applications of transformer core and coil techniques.

Benefits Achieved:

The event, which received press and video coverage, served to provide information about NASA Technology Utilization dissemination services and how the private business sector can use and benefit from applications of NASA/JPL-developed technologies.

Contact for more information:

Name: Norman Chalfin
Tel.: 818/354-2240

4. Division Implements Six-Step Process

Johnson Space Center (JSC)

Description of the Activity:

The Logistics Division initiated a six-step Team Excellence project to involve as many division employees as possible in identifying ways to improve overall operations. The effort included: (1) project planning; (2) diagnosis (fact-finding), that included surveying division employees and those of the major contractor as well as conducting interviews which also included division customers; (3) identification of division objectives and measures; (4) problem solving and action planning followed by (5) implementation, using task teams to analyze highest priority items and develop and implement solutions; and (6) assessment and feedback of results.

Benefits Achieved:

In addition to numerous improvements to provide a more efficient and effective Logistics function, there has been improved teamwork and communication within the division and with customers; improved employee attitude; increased employee innovation, creativity, and participation in problem solving; and improved training of employees.

Contact for more information:

Name: Elsie M. Easley
Tel.: 713/483-6517

5. Establishment of Safety and Technical Awareness Committee

Johnson Space Center (JSC)

Description of the Activity:

In FY 1987, White Sands Test Facility (WSTF) Laboratories Office established a Safety and Technical Awareness Committee which included both NASA and contractor (Lockheed-site support contractor) personnel. With a goal of improving overall operations by ensuring continuing accomplishment of safety and technical oversight, three subcommittees--Watchdog, Strategy, and Tactics--were also established. The Watchdog Subcommittee was tasked to establish open communications with line personnel and periodically review operations in progress. The Strategy Subcommittee then studied areas of concern identified by the Watchdog Subcommittee and recommended appropriate actions to the Technical Awareness Committee. Actions approved by the Technical Awareness Committee were then implemented by the Tactical Subcommittee. Results of these actions included (1) implementation of a systematic program of employee training and staff development and (2) increased emphasis on the use and availability of personal computers.

Benefits Achieved:

Among the benefits were improved communications between management and line personnel, increased use and availability of personal computers, and decreased safety violations. An unanticipated benefit of Watchdog Subcommittee activities was the realization that periodic safety inspections could be combined with other Watchdog Subcommittee activities. Because the Watchdog Subcommittee included the peers of line personnel, there was an increased receptiveness to review activities which developed into a significant decrease in safety violations.

Contact for more information:

Name: David L. Pippen
Tel.: 505/524-5722

6. Participative Effort Produces Strategic Game Plan

Johnson Space Center (JSC)

Description of the Activity:

In FY 1987, JSC initiated a Centerwide strategic planning effort as part of the NASA strategic planning process. The purpose was to help the Center better understand future manned space flight program requirements and determine actions which must be initiated now to prepare for the future.

The JSC process emphasized not only the active participation of Center management, but also the involvement of supervisors and employees across the Center. The goal was to provide broad participation at all levels; younger as well as more senior employees. As a result, over 200 employees were directly involved in the process.

The effort focused on five questions: What is the state of JSC? What external factors need to be considered? Where will the space business be going by the year 2000? What do we want to be doing by the year 2000? How do we get there?

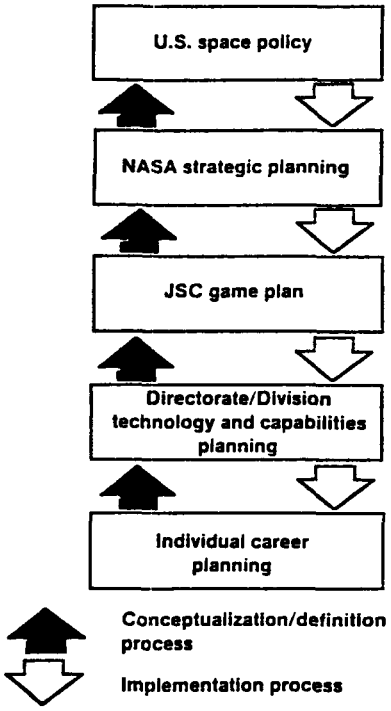
Benefits Achieved:

The most visible product has been the publication of a JSC Strategic Game Plan covering five major areas of emphasis at JSC: (1) National Space Transportation System, (2) Space Station, (3) Technology Development and Utilization, (4) Institutional Excellence, and (5) Relationships with External Constituents. In addition, 30 supporting objectives were also identified.

However, a more important accomplishment has been the teamwork fostered across the Center during the planning process which enabled JSC to develop important data about a number of key areas: strengths and weaknesses, new NASA initiatives and their requirements, and the need to strengthen technologies and capabilities for the future. The planning process also opened communication channels across the Center and throughout the contractor community and developed confidence that JSC can influence its future. Equally important, the effort developed a renewed appreciation of the need for a team effort by the entire U.S. space team.

The next step is the implementation of the plan. The goal is to have all organizations and employees analyze their roles, responsibilities and opportunities, and initiate their own plans and actions to accomplish the multiple objectives that have been established in the strategic game plan. Ultimately, the strengthening of JSC's technologies and capabilities can only be accomplished by enhancing the capability of each JSC employee on the JSC team.

As illustrated in the following figure, JSC's Strategic Planning effort is flowing both upward and downward to all levels, recognizing that individual career planning is critical to the process.



Contact for more information:

Name: Leslie Sullivan
Tel.: 713/483-4723

7. Team Excellence—Centerwide Participation Focuses on Key Performance Areas

Johnson Space Center (JSC)

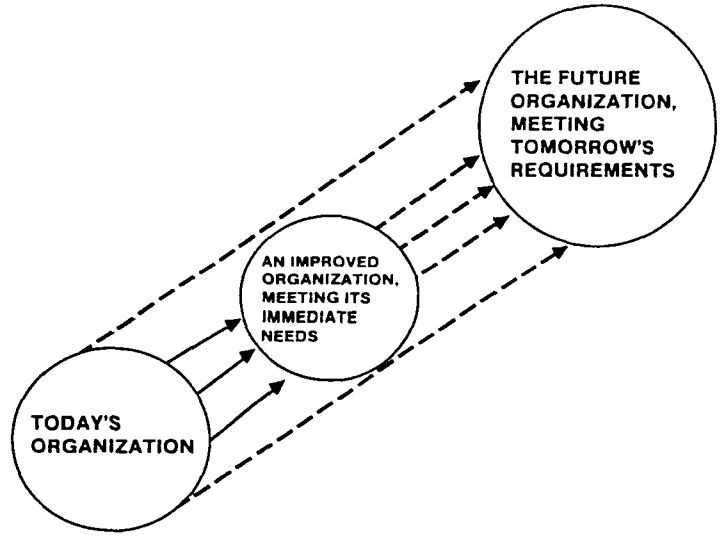
Description of the Activity:

In FY 1987, JSC implemented a Team Excellence program aimed at integrating JSC's multifaceted performance improvement efforts. The main focus was on increasing employee involvement at all levels in enhancing key activities; i.e., activities with the greatest impact on assigned missions and tasks. Team Excellence program elements included action items initiated by individual organizations, a major Centerwide initiative, in-depth organization systems analysis and development initiatives, contractor forum initiatives, and NASA Employee Teams (NETS).

To initiate the effort, major organizational elements developed Team Excellence plans outlining their Team Excellence action items for the year and identifying candidates for in-depth organizational analysis and enhancement. Senior managers identified candidates for the Centerwide initiative. Organizational briefings were given to increase program awareness and promotional materials distributed to both civil service and contractor employees.

Implementation of Team Excellence has occurred concurrently with the Center Strategic Planning effort. As a result, areas identified during the strategic planning effort as requiring additional effort or emphasis are being integrated into Team Excellence activities. Further integration of strategic planning and Team Excellence is anticipated as the Center implements the strategic game plan in FY 1988. The following figure illustrates the interaction between Team Excellence and Strategic Planning.

A STRATEGIC APPROACH TO QUALITY/PRODUCTIVITY IMPROVEMENT



Benefits Achieved:

Performance improvement actions were initiated on 133 individual initiatives in six areas: human resources, improved methods, automation, new technology, contractors, and leadership.

Six in-depth review and improvement projects were initiated in four major organizational components; more than 500 civil service and contractor employees have been directly involved in these projects to date. In addition to service enhancements, benefits have included improved communication, an increase in innovative thinking and creativity, and improved teamwork and morale.

In the Centerwide effort, the six-step process was applied to small purchases procurement, under direction of a Centerwide steering committee. This enhancement effort is being implemented by a multi-organizational task team and working groups representing procurement, logistics, financial management, data processing, and the user community. Immediate "quick fix" improvements have already been implemented. Other actions underway are expected to reduce processing time by approximately 33% in 1988.

In a special pilot activity in a major technical division, a technology and capabilities (T&C) planning exercise was conducted. The lessons learned in this pilot will be useful in modifying the T&C planning process for use in other areas of the Center.

More than 25 contractor organizations are participating in a JSC Contractor Team Excellence Forum co-chaired by JSC and contractor personnel. The Forum is working toward enhanced NASA-contractor and contractor-contractor working relationships and addressing areas of mutual interest. Working groups are exploring innovative contract incentives, opportunities for joint training, and productivity measurement concepts and techniques.

NASA Employee Teams (NETs) were incorporated under Team Excellence with special emphasis given to joint NASA/Contractor Employee Teams and joint training. Ten of JSC's 19 NETs are joint NASA/Contractor NETs: the others are either JSC organizational or multi-organizational NETs. The sharing of training resources among JSC and its contractors began in January 1987. Benefits of this approach are better communication and full utilization of resources, facilitation of joint integrated teams through a common training technique, and development of team trainers in the JSC/Contractor community to lessen dependence on outside organizations for training. In February 1987, more than 200 civil service and contractor members of NETs were recognized in a Group Achievement Award Ceremony and Exposition. The event, attended by approximately 450 employees and managers, was held to recognize NETs contributions and increase awareness of the benefits of the NET process.

Contact for more information:

Name: Wanda M. Thrower
Tel.: 713/483-4211

8. Centralization of Safety, Reliability, and Quality Assurance (SR&QA) Functions

Kennedy Space Center (KSC)

Description of the Activity:

KSC has centralized safety, reliability, and quality assurance functions and established a new first-level Directorate within the KSC organizational structure. Previously, each operational Directorate had Reliability and Quality Assurance under its jurisdiction; civil service safety was a staff organization reporting to the Center Director.

Benefits Achieved:

The new Safety, Reliability, and Quality Assurance Directorate at KSC centralizes Safety, Reliability, and Quality Assurance into one organization and ensures consistent application of standards by co-locating specialists within the operating Directorates. The new Directorate provides an independent assessment of launch readiness and a strong reliability/quality analysis capability.

Contact for more information:

Name: B. Jansen
Tel.: 407/867-7928

9. Commercialization

Kennedy Space Center (KSC)

Description of the Activity:

The Advanced Projects, Technology and Commercialization Office at the Kennedy Space Center, has had a productive year with the addition of the commercialization effort for the Center as a major initiative. The outreach element of commercialization has been a model for the agency with seminars being held in five major cities of Florida. With the cooperation of the Small Business Office of the Procurement Division, the seminars have been well attended and lauded by participants as a welcome addition to the industrial base of the state by sharing technology and increasing business potential.

Benefits Achieved:

The NASA technology base is enhanced by this new approach to sharing ideas with industry and academia. Additionally, the national goals of privatization and commercialization are closer to reality.

Contact for more information:

Name: George Mosakowski
Tel.: 407/867-3494

10. Personnel Initiatives Panel.

Kennedy Space Center (KSC)

Description of the Activity:

The KSC Safety, Reliability, and Quality Assurance (SR&QA) Director established the Personnel Initiatives Panel (PIP) in September of 1987 to act as a system to (1) identify organizational problems, recommend corrective action, and provide a means of communication up to all levels of management; (2) establish the SR&QA function as an aggressive contributor for the overall NASA Team; (3) promote a work force that is manned with quality people who are dedicated to superior performance and the pursuit of excellence; and (4) develop a comprehensive SR&QA program to attract, develop, motivate, and retain the best professional talent available.

Benefits Achieved:

The following are some of the benefits which have accrued from the PIP: (1) the Panel has provided a means for the working people to be heard; (2) a proposed program will recognize personnel outside the Directorate (civil service and contractor) based on excellence in job performance; (3) from the PIP, specific committees were formed to enhance communications and involvement among Directorate personnel; and (4) PIP has established a committee to integrate the Associate Administrator's Safety, Reliability, Maintainability, and Quality Assurance (SRM&QA) inter-center working group's civil service career development plan to meet KSC's needs in this area. This group will work with line management to assist in the implementation of guidelines as they are developed. This effort will take time to mature, but we intend to use this forum to

better understand what other organizations have done and are doing to improve local career development programs.

Contact for more information:

Name: Diane Johnson
Tel.: 407/867-3577

11. Strategic Planning

Kennedy Space Center (KSC)

Description of the Activity:

The Payload Management and Operations Directorate's (CM) Strategic Planning and Implementation Team is made up of employees throughout the directorate who have made a number of recommendations to enhance operational effectiveness, human resources development, and communication. They initiated a survey of CM values which elicited support from over 50 percent of the directorate's employees and managers. The results affirmed the directorate's sense of responsibility, commitment to cooperation, mission success, and honesty. It underscored the need for open communication and commitment to quality standards. The survey promoted awareness and understanding of the strategic planning process and helped achieve desired "grass roots" participation. The directorate's strategic plan gives particular attention to involving young employees in the planning and decision-making process. As a result, the directorate initiated a junior advisory board, Team 2002. This is a group of 17 employees who can reasonably be expected to be working for the agency in the year 2002. The members will rotate off the board, overlapping some experienced members with new members. A group of managers and senior staff serve as advisors and facilitators. Their primary task is to develop 3-5 year goals within a framework that points toward KSC's future roles in payload processing. They are defining a vision, goals, and strategies that will be presented to management for consideration and incorporation in directorate and Center strategic planning.

Benefits Achieved:

Operational effectiveness, human resources development, and communications have been enhanced and the Payload's team has been strengthened through this method of getting people involved.

Contact for more information:

Name: Priscilla Elfrey
Tel.: 407/867-3374

12. Center Top Management Recognition of Quality Circles' Fifth Anniversary

Langley Research Center (LaRC)

Description of the Activity:

On September 18, 1987, the Center Director hosted a recognition ceremony to celebrate Langley's 5 years of contributions from local Quality Circles (QC). All current and previous circle members and their respective supervisors were invited. The agency's Director of Quality and Productivity Improvement Programs also addressed the attendees. Selected examples of QC accomplishments were cited by the QC facilitator.

Benefits Achieved:

A comprehensive brochure with pictures of all of the various QC's and introductory comments by senior management officials was distributed to each attendee and a large pictorial display was set up in the cafeteria. This example of continuing management support was well received and featured in local press coverage.

Contact for more information:

Name: Clarence Cole
Tel.: 804/865-3131

13. Presidential Letter of Commendation to Langley Contract Cost Savings Team

Langley Research Center (LaRC)

Description of the Activity:

Wages and fringe benefits paid under Government construction and support service contracts are established through a mechanism of wage determinations (WD's) issued by the Department of Labor (DOL). A Contract Cost Savings Team was established with three members from Langley's Industry Relations Office and one from the NASA Headquarters Industrial Relations Office. The purpose was to explore instances to negotiate with DOL to receive more favorable or realistic WD's as applied to the contractor work force.

Benefits Achieved:

The efforts of this team were recognized in 1987 by receipt of a Presidential Letter of Commendation as part of the President's Management Improvement Program. Construction savings costs of approximately $500,000 annually have been negotiated. Savings related to wages and fringe benefits saved the Center over $2 million over the past 5 years. Additionally, DOL has agreed to base their WD issuances for Langley support contracts on annual local wage surveys conducted by this team. This is believed to be a unique arrangement.

Contact for more information:

Name: Howard Puckett
Tel.: 804/865-2120

14. LeRC Awareness Program

Lewis Research Center (LeRC)

Description of the Activity:

The Lewis Awareness Program creates, develops, and leads innovative and effective internal programs at the Center that strengthen team pride and build employee commitment. The Awareness Program provides employees with the opportunity to participate in a variety of programs including team recognition programs, where 2,186 employee team members were recognized by the Center Director and Senior Staff; team promotions, where 595 employees were featured in promotional activities and materials; and a wide range of communications programs including Center Director's messages, Directorate messages, and special information exchanges. One particular program, "Issues and Answers," which features senior management answering questions submitted anonymously by employess, was attended by 1,456 employees in 1987.

Benefits Achieved:

The Awareness Program helps to enhance communications between staff and Center senior management, builds employee dedication and pride in working together, promotes excellence in achievement, and encourages continuing improvement. It further demonstrates top management support and concern for employee participation, teamwork, and outstanding performance.

Contact for more information:

Name: Joyce Bergstrom
Tel.: 216/433-2940

15. PIQE (Productivity Improvement and Quality Enhancement) Program Initiatives

Lewis Research Center (LeRC)

Description of the Activity:

The PIQE Program at Lewis is designed to encourage the development and implementation of organizational improvements in a non-threatening, participative environment. It entails a deliberate effort to make significant gains in quality and productivity through planning, implementing, managing, and assessing positive change. Accomplishments for 1987 include the following:

PIQE PLANNING. A number of organizations at Lewis, in such diverse areas as aerospace technology, engineering design and facilities engineering, mounted a concerted effort to identify initiatives which would improve quality and productivity within their organizations. Areas where new initiatives were developed and implemented include equipment upgrades, training, work environment, communications, policies and procedures, customer relationships, and many others. Accomplishments are monitored and assessed to determine any follow-on activities required.

CROSS DIRECTORATE THRUSTS. Senior Staff has approved six PIQE Teams to look at initiatives which involve several or more different directorates at the Center. Current

efforts include quality and productivity incentives for contracts; contractor-integrated suggestion systems; safety incentive systems; moving and office space; performance appraisal; and research process support.

NEWSLETTER. In 1987, the first two issues of a new productivity newsletter, "Working Smarter," were published as part of the Lewis News. The newsletter is published to keep employees informed about the many quality and productivity improvement efforts underway at the Center, and also features successsful initiatives being used by other organizations.

Benefits Achieved:

Through the PIQE Program, the Center is able to provide a framework for commitment to continuous quality and productivity improvement at all levels of the organization. The program provides assistance to organizations striving to improve their organizational effectiveness, and communicates the importance of quality and productivity throughout the Center.

Contact for more information:

Name: David Steigman
Tel.: 216/433-2914

16. Strategic Planning

Lewis Research Center (LeRC)

Description of the Activity:

In 1987, a Strategic Planning Committee was formed to recommend a strategic framework for the Center during the 1990's. A wide range of employees participated on the Committee, which was chartered to evaluate Lewis' strengths, and propose program/project options that would utilize these strengths to the greatest extent possible. Current technology strengths and Lewis facilities/capabilities were examined, along with the Center's internal and external operating environments.

Benefits Achieved:

Strategic planning enables the Center to pull together toward a set of commonly understood goals. Clearly defined long term goals make it easier to make day-to-day decisions in response to problems and opportunities that arise. Widespread employee involvement provides for increased employee ownership and commitment to organizational goals.

Contact for more information:

Name: David Steigman
Tel.: 216/433-2914

17. Center Director Updates

Marshall Space Flight Center (MSFC)

Description of the Activity:

The Center Director has initiated a program of Center Updates that are carried by closed circuit TV throughout the Center. These updates give the Center Director an opportunity to talk to all employees on topics of general interest and concern. In addition, other speakers are included to give detailed presentations of items that affect the general population of MSFC.

Benefits Achieved:

The Updates have been very well received and have provided a boost to employee morale.

Contact for more information:

Name: C. Don Bean
Tel.: 205/544-7491

18. MSFC Strategic Plan

Marshall Space Flight Center (MSFC)

Description of the Activity:

The MSFC Strategic Plan was published in late 1987 with copies distributed to all Center employees. The plan was developed using a participative model which involved a broad cross-section of Center supervisory personnel. The plan starts with a vision, "In concert with NASA's goals to search for an understanding of the universe and to explore the solar system, Marshall's vision is to be the world's leader in space transportation systems and to be a vital national resource for the development and utilization of key space systems that will advance the frontiers of knowledge and human exploration." This vision is supported by seven goals to guide the Center in making the vision a reality. These goals, in turn, are supported by more specific objectives which are designed to achieve the goals.

Benefits Achieved:

The MSFC Strategic Plan will provide a framework for planning and implementing the Center's assigned projects, as well as influence its future. Its distribution to all employees underlines the desire to implant the vision at all levels of the Center. Although further actions need to be taken to ensure that the plan becomes a reality, an important first step has been taken.

Contact for more information:

Name: William Reynolds
Tel.: 205/544-9530

19. Middle Management Seminars

Marshall Space Flight Center (MSFC)

Description of the Activity:

MSFC tested its first Productivity Improvement Seminar for supervisors in May of 1986. The success of this first seminar prompted MSFC to offer two more improved seminars in 1987. These 2-day seminars provide an opportunity for supervisors to learn about productivity improvement from an R&D Productivity expert and to learn more about Marshall's developing Productivity Program. Each major organization participating in the seminar provides insight to the Productivity Improvement Office by identifying which initiatives should be included. The senior managers of the organizations are interviewed and the strategy for the second day is developed from a menu previously prepared by the Productivity Improvement Office. To date, MSFC has trained over 100 middle managers.

Benefits Achieved:

The benefits from the middle management seminars held are twofold. Center middle managers are given increased productivity insights from both a national and local perspective and a renewed understanding of how they can improve the productivity of their organizations and of the programs at the Center that can help them achieve their goals. Further, the impediments to productivity that are identified as part of the first day of the program are passed along to upper management as valuable information for them to use to increase overall Center productivity.

Contact for more information:

Name: Sammy Nabors
Tel.: 205/544-5226

20. Organizational Involvement

Stennis Space Center (SSC)

Description of the Activity:

The Pan Am Facility Operations Support (FOS) Project sponsored a Pan Am Aerospace Division Productivity Conference in 1987 that highlighted innovations and variations in previously installed performance teams.

Benefits Achieved:

The corporate visibility given the SSC/FOS Project has enabled corporate support for a vigorous program that provides for open lines of communication throughout the organization as well as timely identification and resolution of a wide range of performance issues.

Contact for more information:

Name: Dr. Marco Giardino (Pan Am World Services, Inc.)
Tel.: 601/688-1937

21. Employee Participation and Involvement

NASA Headquarters (Code M)

Description of the Activity:

Management continued to provide opportunities for employees to have a voice in activities that affect them. Recently, the Deputy Associate Administrator for Space Flight (Institutions) administered two surveys that requested responses from all employees concerning the utility of the current office automation systems and the quality of work life since the Challenger accident and our recent reorganization. In addition, he surveyed a select number of employees on his individual leadership and communication skills.

Benefits Achieved:

Employees seem to feel better about their work environment when they are afforded an opportunity to comment on matters that affect them. The survey proved to be beneficial to management.

Contact for more information:

Name: Alotta Taylor
Tel.: 202/453-2526

22. Establishment of Safety, Reliability, Maintainability and Quality Assurance (SRM&QA) Working Groups

NASA Headquarters (Code Q)

Description of the Activity:

The Space Station Program Office, Safety/Product Assurance (SSQ) has established a Product Assurance Working Group (PAWG) where Center and international (SRM&QA) partners meet to (1) formulate Program safety/reliability or quality assurance policies and requirements, (2) develop implementation approaches/plans, (3) discuss various SRM&QA activities/problems, and (4) develop solutions as necessary. Within the PAWG, two key subgroups have been established, International Product Assurance Requirements Implementation Group (IPARIG) and Information Planning Group (IPG). The IPARIG is involved in solving specific Space Station SRM&QA issues where the international partners are concerned and the IPG is involved in developing and establishing SRM&QA data base requirements.

Benefits Achieved:

Major benefits are expected because of the early involvement of Space Station SRM&QA personnel in defining, refining, and developing a common understanding of the Space Station SRM&QA requirements. This timely beginning will result in preventive rather than reactive operations.

Contact for more information:

Name: Richard E. Storm
Tel.: 703/487-7010

23. Fourth Annual NASA/Contractors Conference on Quality and Productivity

NASA Headquarters (Code Q)

Description of the Activity:

The NASA Quality and Productivity Improvement Programs Office sponsors an annual NASA/Contractors Conference on Quality and Productivity. In 1987, the theme of the Fourth Annual NASA/Contractors Conference, which was hosted by the Lyndon B. Johnson Space Center in Houston, Texas, was "Achieving Excellence Through Teamwork." Over 40 Government and industry executives gave presentations at the 2-day conference, which was attended by over 450 Government and contractor representatives.

Benefits Achieved:

This activity provides a mutual NASA/Contractor forum to review success stories and identify problems in the quality and productivity areas. The objectives of this conference are to share quality and productivity information so that each attendee can take back some ideas and concepts to his or her organization and to identify problems or issues that represent barriers or inhibitors to improved quality and productivity that the NASA/Contractor team needs to address.

Contact for more information:

Name: Geoffrey B. Templeton
Tel: 202/453-8415

24. NASA Excellence Award for Quality and Productivity

NASA Headquarters (Code Q)

Description of the Activity:

During 1987, NASA selected the first recipients of the NASA Excellence Award for Quality and Productivity. They were Martin Marietta Manned Space Systems, New Orleans, Louisiana, and IBM Federal Systems Division, Houston, Texas. This award was established to encourage superior performance in the aerospace industry.

Benefits Achieved:

The award recognizes outstanding achievements in quality and productivity and the award process itself provides a learning environment for organizations desiring to improve.

Contact for more information:

Name: Anthony T. Diamond
Tel.: 202/453-8415

25. Space Station Operations Management

NASA Headquarters (Code S)

Description of the Activity:

The Space Station Operations Task Force (SSOTF) examined NASA's past operational experience in both manned and unmanned space programs, past experience in the operations of other large Government and private sector systems, and considered "new ways to do business." The SSOTF developed a concept of integrated operations with centralized strategic and tactical control, but decentralized execution of operations functions. From this concept, it identified the essential management processes, support systems, and facilities, and then defined the roles and responsibilities of international partners and various NASA institutions for Space Station operations. The reports of the Task Force (available in early 1988) consist of an Executive Summary, a longer Summary Report, and reports describing the many options considered and their evaluation by the four panels.

Benefits Achieved:

Because the Space Station will be a cooperative endeavor with several international partners, operational aspects of the Space Station pose special challenges. Furthermore, with an expected lifetime of perhaps 30 years, the operational costs of the Space Station will exceed the development costs. The benefits of international cooperation and the magnitude of operational costs can be influenced to a significant degree by careful incorporation of utilization and operational considerations early in the development phase. The SSOTF recommendations are being baselined by the Space Station Program, and are the starting point for the detailed operational planning now underway throughout NASA.

Contact for more information:

Name: Richard E. Halpern
Tel.: 202/453-1181

26. Tracking and Data Relay Satellite System (TDRSS) Program Emphasis on Life Cycle Cost (LCC) Analyses

NASA Headquarters (Code T)

Description of the Activity:

The Office of Space Operations has placed considerable emphasis of Life Cycle Cost (LCC) analyses in the evaluation of contractor proposals to be submitted for the Second TDRSS Ground Terminal (STGT). The Request for Proposal (RFP), which was released in late December 1987, contains a systems engineering requirement to establish and maintain a Life Cycle Cost model which will be used as a basis for cost trade-offs and

analyses during system development. LCC includes the cost of development, acquisition, and 10 years of operations and support.

Benefits Achieved:

Integrated planning and analysis for system development, acquisition, and operations provides the capability to perform relevant trade-offs early in the life cycle to support effective and efficient operations.

Contact for more information:

Name: John C. Rodgers
Tel.: 202/453-2004

27. Multicultural Education Program

NASA Headquarters (Code U)

Description of the Activity:

During FY 1987, NASA's Office of Equal Opportunity Programs (OEOP) continued its efforts to improve the program management skills of the agencywide equal opportunity (EO) staffs by providing training in a multicultural (M/C) approach to the management and implementation of NASA's Equal Opportunity Programs. The training provided was designed to improve cultural literacy, to instill a M/C philosophy in all areas of NASA EO and affirmative action (AA) programs and to better advise and assist NASA's senior managers and capitalize on the positive EO and AA results achieved during the past 13 years. Greater M/C literacy is becoming a necessity as NASA and the Nation grow more culturally diverse and expand partnerships with the international technical community.

Benefits Achieved:

Three major activities were initiated this year to address the above activity; two were training interventions. A NASA Symposium on EO and AA Programs was held in February 1987 which introduced NASA EO personnel to the M/C philosophy and processes for implementing M/C EO and AA Systems Change Models. The second was a NASA EO M/C Training Conference held in August 1987 to provide NASA and Jet Propulsion Laboratory EO Officers and OEOP senior managers an opportunity to review the M/C philosophy with a view toward adopting it as NASA's model for change.

Further, the Director of the Strategic Plans and Programs Division spoke to the OEOP staff about developing a framework for strategic planning to accomplish human resources objectives. As a result, a decision was made to adopt the M/C model, and an agencywide M/C task force was formed to identify optional training approaches, including training sites, that would allow NASA to systematically implement agencywide M/C, EO and/or AA Education Programs. In November 1987, the task force recommendations were presented and approved. One of the recommendations was that a task order contract be negotiated for a 3-year M/C, EO and/or AA Education Program. This type of contract would provide NASA with the continuity and uniformity that is required to successfully develop and establish a M/C model for change.

Contact for more information:

Name: Lewin S. Warren
Tel: 202/453-2163

28. Office of Inspector General (OIG) Focuses Investigative Interests on Substantive Matters

NASA Headquarters (Code W)

Description of the Activity:

The OIG focused the emphasis of its investigative program on quality and substantive matters, referred minor administrative issues not requiring action by criminal investigators to NASA management for resolution. During FY 1987, in part as a result of the new investigative emphasis on substantive issues, OIG investigations resulted in financial recoveries exceeding $6 million. The recoveries were primarily achieved from investigative cases involving allegations of cost mischarging, failure to meet contract specifications, and submission of false statements by NASA contractors and subcontractors.

Benefits Achieved:

Working together with audit teams comprised of auditors from the OIG and the Defense Contract Audit Agency (DCAA), and jointly with investigators from other Federal agencies, the OIG continued to develop cases having significant financial and programmatic impact. Effective management of the cases maximized OIG efforts on these matters with minimal resources and continued a consistent record of positive results.

Contact for more information:

Name: Carroll S. Little
Tel.: 202/453-1229

29. Educational Technology

NASA Headquarters (Code X)

Description of the Activity:

NASA Educational Affairs conducted two satellite videoconferences for elementary and secondary teachers in 1987. The direct satellite programs were 1 hour in length, live, interactive, and designed to provide teachers content information on NASA activities in aerospace, aerospace-related demonstrations and activities for the classroom, and to inform teachers of NASA educational materials available for their classroom. The first program conducted on October 20, 1987, featured the Hubble Space Telescope and in the second program on November 18, 1987, Commander Rick Hauck discussed the status of the next Space Shuttle flight.

Benefits Achieved:

The two satellite videoconferences received enthusiastic acceptance. Nearly 20,000 elementary and secondary teachers, representing all 50 states, participated in each program. Many school systems videotaped the program and used it for staff development in their school systems. Thousands of teachers ordered teaching materials to support the teaching of space concepts presented during the programs related to the Hubble Space Telescope and Space Shuttle. The videoconferencing concept enabled NASA Educational Affairs to expand its delivery system to teachers in a practical, economic, and futuristic fashion.

Contact for more information:

Name: William Nixon
Tel.: 202/453-8388

30. Summer Faculty Fellowship Program

NASA Headquarters (Code X)

Description of the Activity:

The NASA Summer Faculty Fellowship Program has completed 24 years of operation. This program enables young faculty members to spend 10 weeks working directly with scientists and engineers at NASA field centers on problems of mutual interest.

Benefits Achieved:

In cooperation with NASA Center Coordinators, a focused recruitment effort this year increased the minority participation. Minority recruitment efforts targeted 97 Historically Black Colleges and Universities which yielded 92 applicants to the program. Of these, 40 were selected including 23 Blacks, 12 Asians, and 2 Caucasians. No Hispanics or American Indians were represented in this effort, reflecting absence of these groups on the faculties at HBCU's. There was a 70-percent increase in the number of American Blacks from 14 in 1986 to 23 in 1987, while the number of HBCU's participating in the program increased 1050% from 2 to 21 over the same period.

Contact for more information:

Name: Jackie Counts
Tel.: 202/453-8347

31. Summer High School Apprenticeship Research Program (SHARP)

NASA Headquarters (Code X)

Description of the Activity:

The SHARP Program, initiated at NASA in 1979 in response to a Presidential Directive, offers approximately 150 students, mostly members of minority groups, the opportunity to participate in an intensive science and engineering apprenticeship program. The apprentices earn and learn at NASA installations for 8 weeks during the summer.

Benefits Achieved:

In 1987, a total of 145 talented high school students, 22 more than in 1986, gained first-hand knowledge about science and engineering careers by participating in SHARP programs at eight NASA centers or facilities. SHARP has become a feeder program which is helping to increase the pool of applicants, particularly minorities, for current and future NASA employment.

Contact for more information:

Name: Roscoe Monroe
Tel.: 202/453-8397

II. HUMAN RESOURCES

32. Ames Fellow

Ames Research Center (ARC)

Description of the Activity:

The Ames Fellow program has been established to identify and acknowledge a very small number of Ames employees for their national or international reputation for scientific or engineering excellence in the field of aerospace. Eligible candidates must be full-time civil servants with 10 years of professional-level civil service employment at Ames. No more than one Ames Fellow may be selected per any calendar year, and no more than five under the employment of Ames. Recipients of the Ames Fellow receive a plaque, are given a dinner, and have their portrait painted. Additionally, recipients receive travel funds of $5,000 per year for five years, and research funds of $25,000 per year for a period of 5 years.

Benefits Achieved:

Increased awareness of Ames staff to the importance of superior research as well as recognition of the exceptional reputation selected members of the Ames research community have achieved.

Contact for more information:

Name: Barbara Busch
Tel.: 415/694-5422

33. Ames Honor Awards

Ames Research Center (ARC)

Description of the Activity:

The installation established the Ames Honor Awards as a Center parallel to the NASA Honor Awards. The unique feature of the Ames Honor Awards is that peer nominations are accepted. The categories include such areas as clerical, administrative, scientist, engineer, best first paper, co-op student, and an annual award in the safety, quality and productivity area. There is also a contractor employee category. In FY 1987, 38 employees (including 5 contractors) were recognized.

Benefits Achieved:

The award program is very popular and is well-responded-to by employees as well as managers. There is a strong sense of community that is generated when we "recognize our own." Non-management employees as well as managers have a strong voice in the nominations and on the review panels.

Contact for more information:

Name: Barbara Busch
Tel.: 415/694-5422

34. New Employee Transition

Ames Research Center (ARC)

Description of the Activity:

The international reputation Ames Research Center holds as a premier research facility is to a significant degree attributable to the high caliber of the work force. A new employee is considered a valuable resource. Ames has developed and instituted a variety of programs to meet the unique needs of our new employees.

1. IDEAS (Interactive Development of Engineers, Administrators, and Scientists) is a year-long program which brings together in a workshop setting newly hired professionals and a few well-respected middle managers for five 2-day workshops.

2. Co-op students and new hires that come to Ames from outside the San Francisco Bay area are sometimes overwhelmed with the high cost of living in this area. Initial expenses for housing, telephones, security deposits, etc., sometimes exceed their available resources. In cooperation with the Ames Exchange Council (our employee organization which generates and manages non-appropriated funds), new employees are offered a no-interest loan not to exceed $600. In FY 1987, 20 individuals were accommodated.

3. The Ames Alliance is a group of newly hired professionals at Ames. They formed as a support group to help meet some of the unique needs of new employees such as housing, transportation, social/friendships, etc.

Benefits Achieved:

A special networking has begun to develop among these newer employees which provides them with a sense of belonging and a better understanding of their new work place, Ames Research Center. Initial adjustments and stress associated with a new career are reduced. The interaction and exposure to more senior professionals results in the Center's corporate values and culture being passed on, person to person.

Contact for more information:

Name: Linda Jensen
Tel.: 415/694-6985

35. Property Custodian Award Program

Ames Research Center (ARC)

Description of the Activity:

A Property Custodian Award Program was established in 1987 to recognize and reward the work being accomplished by the Center's property custodians. Top property custodians are nominated by their division chiefs and reviewed by the Property Custodian Award Review Committee. Seven outstanding property custodians were recognized and received cash awards in 1987.

Benefits Achieved:

Property Custodians are recognized for their efforts to control and account for the Center's decaled property. This is generally an add-on responsibility that is prioritized against many other job elements. Giving incentive to the property custodian element increases the property custodian's awareness and motivation. This award program contributed, along with other factors, to a decrease in surveyed items in FY 1986, down approximately 50 percent in both number and cost of items from FY 1985. It is anticipated that this emphasis will continue to contribute to a decrease in the number of items being surveyed each year.

Contact for more information:

Name: Rick J. Serrano
Tel.: 415/694-5137

36. Employee Involvement Groups

Goddard Space Flight Center (GSFC)

Description of the Activity:

The purpose of this activity is to help work groups within the Engineering Directorate to identify and analyze work-related barriers affecting group performance and to suggest creative ways to remove those barriers.

Benefits Achieved:

During FY 1987, the Fabrication Management Section successfully completed this process. As a result of their recommendations, a support service contract was awarded which replaced about 14 fabrication work-order contracts. This change is now saving Goddard considerable procurement time and money.

Contact for more information:

Name: Cindy Thornberry
Tel.: 301/286-2414

37. Procurement Customer Advisory Council (PCAC)

Goddard Space Flight Center (GSFC)

Description of the Activity:

Feedback from our customers is an important means of finding ways to do our job better. The establishment of a Procurement Customer Advisory Council (PCAC) made up of representatives from each Directorate meets with procurement management to present suggestions, recommendations, complaints, chronic problems, or any other kinds of information.

Benefits Achieved:

Improved communication with and involvement of the user.

Contact for more information:

Name: William Landymore
Tel.: 301/286-9209

38. Energy Conservation, Awareness, and Recognition Program

Jet Propulsion Laboratory (JPL)

Description of the Activity:

The Energy Conservation, Awareness, and Recognition Program (ECARP) was initiated to reduce energy consumption levels at the NASA/JPL Deep Space Communications Complex (DSCC) at Goldstone, California, by 50 percent as compared to its baseline in 1973. It followed a two-prong approach: (1) to perform energy conservation/conversion studies as well as detailed design and implementation of cost-effective modification of equipment; and (2) to stimulate employee awareness of and participation in conservation. Lectures, posters, newsletters, room stickers, calendars, recognition pins and certificates of achievement promoted conservation, and employees were encouraged to submit suggestions for energy reduction. Energy Conservation Representatives were nominated for each DSCC building; these individuals monitored energy levels and responded to suggestions from co-workers.

Benefits Achieved:

The program successfully accomplished its 50-percent reduction goal and created a sense of quality teamwork with high levels of responsibility and participation. It served as a model for parallel programs at the Madrid and Melbourne NASA/JPL Deep Space Communications Complexes. The program has saved over $10 million in avoided energy costs over the last 10 years.

Contact for more information:

Name: Fikry Lansing
Tel.: 818/354-1781

39. Establishment of Simulator Up-Time Committee

Johnson Space Center (JSC)

Description of the Activity:

A quality circle working group was established to evaluate the procedures, failure reports, and activity logs in the Systems Engineering Simulator (SES). The SES is a facility with the capability to support man-in-the-loop simulations of all spacecraft mission phases: ascent/abort, on-orbit, and entry/orbit. Procedures for the SES were reviewed by the Up-time Committee and rewritten where necessary. The Committee also recommended additional training and the establishment of a "hot spares" test bed.

Benefits Achieved:

As a result of the recommendations and actions of the Up-time Committee, there were fewer failures on-line and a quicker return to up-status. Improvements include: (1) The number of discrepancy reports at the beginning of 1987 was 55 percent lower than at the beginning of 1986. (2) There were 27 percent fewer discrepancy reports opened during 1987 compared to 1986. (3) There were 29 percent fewer interim discrepancy reports opened during 1987 compared to 1986. (4) System up-time increased by approximately 7 percent.

Contact for more information:

Name: J. J. Liput
Tel.: 713/483-1605

40. Increased Focus on Human Resource Development

Johnson Space Center (JSC)

Description of the Activity:

The Mission Operations Directorate (MOD) and Administration Directorate are increasing their focus on human resources through Human Resources Councils/Committees. The goals of the MOD Human Resource Committee are to provide MOD personnel with feedback on their concerns, develop concrete actions, obtain management approval for those actions, and delegate implementation responsibility for each plan. The Administration Directorate's Human Resources Council provides a medium for involving the Directorate senior staff in the process of human resources development.

The White Sands Test Range (WSTF), Safety Reliability and Quality Assurance Office (SR&QA), and MOD have taken actions to develop and implement training and orientation programs which allow new employees to quickly become familiar with their working environment and responsibilities. The WSTF Laboratories Office (LO) has developed a modularized training program designed to be self-paced. In MOD, a three-phase training plan was developed and implemented which leads to functional/job certification of MOD personnel. The comprehensive SR&QA training program for new hires incorporates JSC's intern program requirements.

The Human Resources Office has implemented (1) two courses associated with leadership skills for nonsupervisory employees, and (2) an On-Line Training Catalog available to all employees through the Center Information Network (CIN) using the Professional Office System (PROFS).

Benefits Achieved:

The Human Resource Committee in MOD has expanded interface between MOD management and MOD employees. Of the actions considered by the MOD Committee, 15 are complete, 10 are in work, and 4 near completion. This has significantly improved lines of communication and increased employee morale while improving operations and human resources utilization. In the Administration Directorate there has been increased involvement of Directorate senior staff in the development of personnel policies and procedures for the organization. In addition, senior staff input concerning placement of co-ops and Presidential Management Interns ensures maximum development of a valuable personnel resource. The WSTF, MOD, and SR&QA training programs have resulted in more rapid integration and effectiveness of new employees. Leadership training has (1) provided individual performers with greater understanding and improved skills to handle tasks that involve leading or directing others (important given that many program and project lead personnel, and many subsystem managers, are nonsupervisory), and (2) exposed future and potential supervisors to managerial practices and concepts that will enable them, if selected to supervisory positions, to assimulate more rapidly into the managerial environment. The on-line training information has been helpful in allowing employees to research course information prior to pursuing possible course enrollment.

Contact for more information:

Name: Ben E. Ferguson
Tel.: 713/483-4266

41. Overtime Control/Fatigue Reporting

Kennedy Space Center (KSC)

Description of the Activity:

A system has been developed that tracks and monitors employee's overtime usage in coordination with Finance and Program Controls. This system has been integrated into the timecard system, and uses the daily timecard information to generate various work pattern analysis reports. The system identifies potential threshold problems by tracking and reporting the following work pattern thresholds/limits: (1) An employee should not be allowed to work in excess of 12 hours in any given workday, without prior approval by the Program Manager. If approval is received, the employee is allowed to work a maximum of an additional 4 hours, a total of 16 hours in the day, and the employee must be allowed a minimum of 8 hours off before returning to work. (2) An employee should not be allowed to work in excess of 60 hours in any given workweek, and/or work more than 6 consecutive days without receiving one full day off. This threshold can only be exceeded with prior approval of the Program Manager. (3) An employee should not be allowed to work in excess of 2,500 hours in a given calendar year without the prior approval of the Program Manager.

Benefits Achieved:

Provides management with the information needed to ensure that all of the company's and NASA's policies on fatigue and work limits are enforced. This system also projects future hours based on year-to-date history to optimize work scheduling.

Contact for more information:

Name: Clarke C. Carroll (Lockheed Space Operations Company)
Tel.: 407/383-2231

42. Automated Applicant Supply File

Langley Research Center (LaRC)

Description of the Activity:

An automated system has been developed for recording and cataloging applications from candidates seeking employment at Langley Research Center. The work, including responses to applicants, is accomplished by the Placement and Position Management Branch, Personnel Division. The applications are used by Center supervisors and managers as a source for filling position vacancies.

Benefits Achieved:

The benefits achieved are greater productivity, improved staffing services to Center management, and improved responsiveness to the applicants, e.g., 1,200 more applications per year were processed.

Contact for more information:

Name: Alan Morse
Tel.: 804/865-3007

43. Langley Alumni Association Formed

Langley Research Center (LaRC)

Description of the Activity:

1987 saw the establishment of an alumni association made up of retirees and former employees of the Center. A steering group was formed to develop by-laws and a framework for operation. Interest has been high by those contacted and a membership drive has been started. The association members assisted the Center in the celebration of the Center's 70th Anniversary and Open House for the local community. On October 17, 1987, the association sponsored a 70th Anniversary Banquet in Williamsburg, Virginia, to honor Center employees.

Benefits Achieved:

Provides a forum for active participation by former employees, most of whom want to be kept informed of Center happenings. In addition to volunteer service at the Visitor

Center, active giving to the Combined Federal Campaign, and similar functions already in place, its envisioned members can assist in responding to numerious requests for speakers and community projects by the Center.

Contact for more information:

Name: A. G. Price
Tel.: 804/865-2932

44. Opening of New LaRC Fitness Center

Langley Research Center (LaRC)

Description of the Activity:

Comprehensive fitness program developed as part of total wellness program. This fitness center consists of 4,000 square feet equipped with state-of-the-art equipment including Cybex Eagle and Hydrofitness weight training, stairmasters, treadmills, Schwinn Air Dyne bikes, aerobicycle, and rowing machines for aerobics. Participants must have physical, treadmill test approved by medical director and program specifically designed for individual. Two introductory visits are required prior to participation.

Benefits Achieved:

Six-month evaluation indicates reduction in heart rate, blood pressure and inches.

Contact for more information:

Name: Peter J. Edgette
Tel.: 804/865-2605

45. Pilot Organizational Function Analysis Project

Langley Research Center (LaRC)

Description of the Activity:

The Systems Engineering Division initiated a Division-wide function analysis study in 1986 which was completed in 1987. The pilot study was facilitated by loaned executives from the Westinghouse Defense and Electronics Center in Baltimore, Maryland. The Division charter and overall functions were extensively evaluated including detailed customer feedback obtained by personal interviews by the Division Chief. Several key issues were identified and action teams were organized to address each issue and make recommendations for resolution or improvement.

Benefits Achieved:

The exercise focused upon significant areas with both individual employees and line managers actively involved. The assessment by their customers was an important ingredient. At a Division-wide meeting, results of the project were shared in detail.

Improved communications across organizational lines was cited as a direct benefit. Over 50 percent of the recommendations made have already been incorporated into Divison operational policy and procedures.

Contact for more information:

Name: Ralph Muraca
Tel.: 804/865-4539

46. Employee Involvement Program Development

Lewis Research Center (LeRC)

Description of the Activity:

Lewis developed a special training curriculum to respond to the developmental needs associated with the joint union/management cooperation initiative. Two conferences and six different workshops were offered resulting in nearly 500 completions. In addition, problem-solving training was provided to 16 members of ad hoc Labor Management Participation Teams (LMPT), who work on issues under the cooperative agreement with AFGE.

Six residential training programs designed to promote participative theories, practices, and interaction were conducted in FY 1987; three sessions of ACE (Action for Competence and Excellence) for managers, two sessions of LEP (Leadership Education Program) for supervisors, and one session of BEST (Building Excellence Through Secretarial Teamwork) for experienced Lewis secretaries. To date, 468 managers and supervisors have completed ACE or LEP.

Lewis managers and supervisors taught their employees the ideas and principles taught in the ACE and LEP programs in Lewis' Closing the Loop program. Closing the Loop consists of a one-half day to 1-day training program followed by up to 4 months of follow-on sessions. More than 2,700 employees have now completed this program, with 1,342 completions in 1987.

Lewis' Quality Circle program, a key element in the development of participative culture, expanded its scope and activities in a number of new areas. Three new circles were formed, and a 1-year developmental position was created and staffed in the branch for an experienced facilitator to assist in the program coordination. Training events included a new 3-day conference, open to all Lewis employees, which offered 15 workshop choices resulting in 443 completions; a quality circle conference leading to 153 completions in five different courses, 56 completions in two core QC courses, and 83 attendees at the IAQC conference at Kent State. In addition to the many QC projects proposed and implemented during the year, two were approved for lab-wide implementation; an awards program for secretarial and clerical workers, and a PC users group and newsletter.

Career counseling and planning resources expanded to include outside professional testing and assessment capability. The career planning workshop was conducted five times, and the career guidance workshop was conducted five times. Individual career counseling occurrences averaged 20 per month.

Benefits Achieved:

Participative management has provided optimum quality and productivity from our human resources. Through developing knowledge and skill in participative management, employees integrate their task and process effectiveness for maximum productivity. Employees are able to have more influence in the performance of their responsibilities, resulting in more commitment, ownership and satisfaction in their work. Problems can be resolved through collaboration as opposed to conflict, and higher quality solutions can be developed.

Contact for more information:

Name: C. Forman
Tel.: 216/433-2914

47. Employee Suggestion Program Enhancement

Lewis Research Center (LeRC)

Description of the Activity:

In 1987, the combined General Schedule and Wage Grade suggestion committees embarked on an initiative to improve participation in the Employee Suggestion Program. The following are some of the steps taken in the effort to enhance the program: (1) A memo encouraging participation was sent to all Lewis employees; a blank suggestion form was attached. 32 percent of the suggestions received over the next 2 months were in response to that memo. (2) Locations where employees could get suggestion forms were increased to 38. (3) A course on the Incentive Award Program was provided to new supervisors. (4) The job relatedness criterion was revised. The revised guidelines allow a full award to be granted even if a suggestion is job related, providing that the contribution is of particular significance or importance; a great amount of independent thought or insight was involved; or there will be substantial benefits from implementation. (5) Evaluator guidelines were developed and letters of appreciation and coffee mugs were given to evaluators. (6) New file folders were created to reduce turnaround time; the oversize folders stick out of an evaluator's in basket, serving as a constant reminder.

Benefits Achieved:

Employee participation in the Suggestion Program increased by more than 50 percent from FY 1986 to FY 1987.

Contact for more information:

Name: L. Corpora
Tel.: 216/433-6757

48. Pilot Programs in Subordinate Appraisal of Supervisors

Lewis Research Center (LeRC)

Description of the Activity:

The Test Installations Division and Power Technology Division implemented pilot programs in subordinate evaluation of supervisors in 1986. Questionnaires were developed jointly by management/employee teams and were sent to all covered employees. Response to the questionnaires, which asked employees to evaluate their supervisor on a variety of dimensions of managerial performance, was voluntary and preserved the anonymity of the respondents. Overall response rates exceeded 50 percent of those surveyed. Supervisors were encouraged to use the survey results to improve their skills and performance; this could or did include discussions with supervisors, subordinates, and/or employee development specialists. The surveys were intended to provide a positive tool for feedback and improvement; they were not tied to the formal performance appraisal process. Follow-on surveys will be conducted to determine whether or not supervisors have, in fact, improved their performance.

Benefits Achieved:

Subordinate appraisals provide a unique opportunity for communications, feedback, and supervisory development. Subordinates are in a better position to evaluate certain aspects of a manager's peformance. The multiple ratings received from a group of employeees may also have greater validity than the rating of a single person. When properly implemented, subordinate appraisal systems enhance worker job satisfaction and morale. They provide an excellent mechnism for encouraging meaningful dialogue and a positive atmosphere for improvement.

Contact for more information:

Name: David Steigman
Tel.: 216/433-2914

49. Incentive Awards

Marshall Space Flight Center (MSFC)

Description of the Activity:

Incentive award funds available for recognizing employee and group accomplishments were increased by 44 percent in 1983, by 20 percent in 1984, by 10 percent in 1985, by 23 percent in 1986, by 9 percent in 1987, and will be increased by 19 percent in 1988.

Benefits Achieved:

In 1987, approximately $765,134 of incentive awards money (including merit pay cash awards) was presented to 1,330 employees for individual or group achievement. In addition, 686 employees were honored with nonmonetary awards, and 269 employees were recognized with NASA Headquarters honorary awards. Overall, the Center awards program effectively recognized 81 percent (2,837 employees) of Center employees for contributions to Center success in 1986. The Center also presented 303 nonmonetary awards to contractors during the past fiscal year.

Contact for more information:

Name: C. Don Bean
Tel.: 205/544-7491

50. Investment in Excellence

Marshall Space Flight Center (MSFC)

Description of the Activity:

The Investment in Excellence (IIE) videotape series introduced at MSFC 3 years ago has been presented to over 35 percent of the MSFC employees. IIE is a series of educational tapes designed to enhance an individual's personal and professional growth by structuring a positive attitude toward change. During 1987, in addition to the training of more Center personnel in the program, the founder of the IIE program made personal presentations to both management and employees of the Center. These programs were well received with over 90 managers attending the management session and over 400 employees attending the employee session with others watching over closed circuit TV throughout the Center. Further, three sets of tapes especially designed for use within the family have been purchased by MARS and are available for checkout by Center employees.

Benefits Achieved:

As a result of these efforts, renewed interest has been shown in the program, especially by top management. In addition, other NASA centers and Headquarters have expressed a desire to learn more about this motivational tool.

Contact for more information:

Name: Larry Lechner
Tel.: 205/544-5227

51. NASA Employee Teams (NETS)

Marshall Space Flight Center (MSFC)

Description of the Activity:

Twenty-seven NETS are currently active at the Marshall Space Flight Center. Starting with the Center Director who hosted a NET Recognition Program on June 9, 1987, this employee involvement initiative is being revitalized. Eleven Teams were honored with Group Achievement Awards during the recognition program for contributions toward improving the efficiency of the Center. Mr. J. R. Thompson, the Director, established the Center Director's Annual NET Award of Excellence in recognition of the importance of NETS at MSFC. The Annual NET Leadership Award was presented posthumously to Douglas E. Sandridge, who exemplified the idea of participative NET leadership. In October 1987, 10 individuals representing two of the NASA Employee Teams were honored by the Manned Flight Awareness Program for their outstanding efforts in support of the Nation's manned space program.

Benefits Achieved:

Members of the NETS continue to view their participation in the NET process enthusiastically. Comments from selective participants follow: (1) "The NETS have opened a line of communication to management that had not existed before." (2) "Working with a team is an exciting personal growth experience, but when the team completes a project, there is a shared sense of accomplishment and comradeship that is hard to beat." (3) "The NET process gives an opportunity to work with individuals in several organizations and of varied disciplines. There is a feeling of pride and accomplishment which comes from helping teams successfully use the NET process and knowing the resulting improvements contribute to the overall operation of the Center." The employees and supervisors involved in the NET process at Marshall know that NETS DO WORK!!! The agenda for the foreseeable future will be to continue revitalization of NETS through orientation and top-down training of selective major internal organizations.

Contact for more information:

Name: Carolyn McMillan
Tel.: 205/544-9523

52. Time Management Courses

Marshall Space Flight Center (MSFC)

Description of the Activity:

MSFC has tested and investigated two Time Management courses and has elected to offer both courses at the Center. The courses offer separate approaches to Time Management; however, the outcome of each course is the same, increased individual productivity. With two approaches, a greater percentage of employees can be reached. The two courses offered are Time Power and Time Systems. Time Power is a 2-day course developed for participants who are skeptical that effective time management can increase personal effectiveness. This course offers greater emphasis on goal setting and decision-making and provides new insights to the participants who are already committed to time management practices, but have not been using a systematic approach. Time Systems focuses more on the use of their time management tool which provides a very effective system for the management.

Benefits Achieved:

Effective Time Management is a powerful tool that can be used to streamline a workday for better results, stay focused on daily priorities, avoid procrastination and initiate effective delegation. Studies show that productivity increases using time management techniques can be as much as 25-30 percent. To date MSFC has trained 168 employees. We are now in the process of working the requirements for FY 1988 and FY 1989.

Contact for more information:

Name: Sammy Nabors
Tel.: 205/544-5226

53. Performance Team Expansion

Stennis Space Center (SSC)

Description of the Activity:

Presently 13 Performance Teams are established. Their goal is to participatively select work criteria for the group and to measure monthly performance on some four to six goals. Team scores are posted in each work area, with trends developed and published in a quarterly report.

Benefits Achieved:

Since the inception of Performance Teams within the FOS Project, participating groups have improved their performance by an average of 120 percent over original performance baselines. A significant portion of the improvement is due to the teams' efforts in problem solving; consistent feedback and clearer goal definition also contribute to the improvement. Absenteeism has decreased significantly for the project, presently averaging just under 4 percent. Of four teams that selected absenteeism as a performance criterion, the average absence rate was 2.55 percent.

Contact for more information:

Name: Dr. Marco Giardino (Pan Am World Services, Inc.)
Tel.: 601/688-1937

54. Personal Development

Stennis Space Center (SSC)

Description of the Activity:

Recent emphasis has been placed on training with respect to personal accountability, responsibility and goal setting.

Benefits Achieved:

From 1986 to 1987, the percentage of the Flight Operations Support work force provided personal development training increased from 2 to 21 percent.

Contact for more information:

Name: Dr. Marco Giardino (Pan Am World Services, Inc.)
Tel.: 601/688-1937

55. Employee Opportunities

NASA Headquarters (Code M)

Description of the Activity:

In February 1987, Code M went through an extensive reorganization. The purpose of the reorganization was to develop and implement a program management structure, reporting channels, and decision-making process that would assure the safe return of the Space Shuttle to flight status and develop advanced space transportation capabilities.

Benefits Achieved:

While the Shuttle is not scheduled for flight until the summer of 1988, the reorganization created approximately one-third of the GS/GM employees new opportunities and career changes.

Contact for more information:

Name: Alotta Taylor
Tel.: 202/453-2526

56. Improving Employee Motivation and Morale Through Manned Flight Awareness Activities

NASA Headquarters (Code M)

Description of the Activity:

The Manned Flight Awareness (MFA) Program is one of NASA's most successful, visible, and effective employee motivation programs. It communicates to Government and industry employees a team concept and makes them aware that they are working on critical hardware/software for manned space flights. The primary objective of the program is to help ensure mission success and astronaut safety through employee awareness. During 1987, the MFA Program sponsored two very successful honoree events, one at NASA Headquarters and one at the Marshall Space Flight Center. Over 500 Government and industry employees received this special recognition for their outstanding contributions which included a VIP tour of NASA facilities and a reception in their honor with senior Government/industry management and members of the Astronaut Corps in attendance.

Benefits Achieved:

Throughout the past year, the MFA activities have helped to resolve the morale problem, to increase employee/management joint participation, and to rededicate the NASA work force toward quality workmanship in achieving our goal of returning the Shuttle to a safe and successful flight status in 1988.

Contact for more information:

Name: Alotta Taylor
Tel.: 202/453-2526

57. NASA Headquarters Postal Convenience Center

NASA Headquarters (Code N)

Description of the Activity:

The first Federal Postal Convenience Center (PCC) was installed at NASA Headquarters to increase services for HQ employees' personal use. The installation of this facility was the result of a 98-percent positive response to an employee survey.

Benefits Achieved:

The PCC enhances Headquarters adrninistration services and saves employees and the Government time.

Contact for more information:

Name: Benita Cooper
Tel.: 202/453-1030

III. IMPROVED METHODS/PROCEDURES

58. Backup Pioneer Spacecraft Operations on Microcomputer

Ames Research Center (ARC)

Description of the Activity:

The control of the several Pioneer spacecrafts requires large computer programs running on two mainframes for real-time monitoring. The activity must be supported 24 hours per day, 365 days per year. During periods of major computer failures, the monitoring is hampered by the requirement to share the remaining resources. Furthermore, the complexity of the software precludes processing of the data down to the bit level to assist in the analysis of spacecraft or communications anomalies. A special interface controller to the communications circuits was designed for an IBM XT Microcomputer. With the use of flexible single software in the computer, critical spacecraft parameters (e.g., power, temperature, instrument status) may be monitored directly without the use of the mainframe computers. Additionally, raw data dumps may be made to assist in the isolation of communications or spacecraft anomalies.

Benefits Achieved:

The simple, relatively inexpensive microcomputer serves as a critical backup and analysis tool for Pioneer spacecraft control without necessitating the use of expensive larger computers.

Contact for more information:

Name: Richard O. Fimmel
Tel.: 415/694-6456

59. Ion Drift Spectometer/Construction of Prototype Mechanical Assembly

Ames Research Center (ARC)

Description of the Activity:

In deciding the most cost-effective process to use in the construction of the prototype mechanical assembly for the Ion Drift Spectrometer, an analysis of in-house versus contracting was done.

Benefits Achieved:

A savings of $37.7K was realized (In-house cost of $15.1K vs. contracting out cost of $52.8K). In addition, a 7-month startup time delay would be completely avoided by utilizing the in-house option, and the project was estimated to be completed in 4 months in-house vs. 8 months (plus 7 months startup) by contracting. Time to completion of the assembly project would be decreased by 11 months.

Contact for more information:

Name: Glenn Carle
Tel.: 415/694-5765

60. Modem Path Between Ames-Dryden's Workstations and Vendors To Transmit Detailed Printed Circuit Board Information

Ames Research Center (ARC)

Description of the Activity:

Previously, it would have taken 6 to 8 weeks for Ames-Dryden to receive printed circuit boards from Hunter Technology, a Government subcontractor. This time has been reduced to 4 weeks. A modem path has been set up between Ames-Dryden's Versatec Workstation and two vendors who support the subcontractor. One vendor, Image Technology, receives Gerber files on printed circuit boards, creates negatives and delivers them to the subcontractor within 1 day. Another vendor, The Bit Shop, receives printed circuit board drilling information via modem and creates drilling tapes for the subcontractor which further reduces the turnaround time.

Benefits Achieved:

The previous procedure required that Ames-Dryden create tapes, take them to another Government agency (Air Force) for photoplotting, retrieve the negatives when completed by the Air Force, and then mail them to the subcontractor. The cost of the modem path is negligible, while the improvement in turnaround time for printed circuit boards is significant. The net result is that board turnaround time has been improved by at least 33 percent.

Contact for more information:

Name: Charles Brown
Tel.: 805/258-3155

61. Revised Service Request Form

Ames Research Center (ARC)

Description of the Activity:

The joint civil service and contractor quality circle, the Focal Points, designed a new and improved Service Request to be used by requesters of the Imaging Technology Branch's services. The old multipurpose, six-page, carbon interleaved form was discarded and a new three-page, customized form that simplifies the customer's entries to accommodate the specialized photographic services or end items being requested was developed and put into use.

Benefits Achieved:

Time to review, evaluate and verify requirements is decreased. Compatibility with the barcode system will ease the timely implementation of this new technology. General timeliness and customer responsiveness is improved.

Contact for more information:

Name: Roland P. Michaelis
Tel.: 415/694-5071

62. Automated 700 Contractor Manpower System (CORTS)

Goddard Space Flight Center (GSFC)

Description of the Activity:

Contractor Resource Tracking System (CORTS) is a PC-based system designed to input, maintain, and report current and historical data on each support service contract that a Financial Analyst (FA) tracks. The data is entered on a spreadsheet-type screen on any PC and is then transferred to a central data base of the file server. From this central data base, canned programs can be executed to produce summary charts and reports.

Benefits Achieved:

A closer control and review of the support service contracts is now possible with this system then was available in the past. Management can take corrective action on problem areas before they become major problems.

Contact for more information:

Name: Roland Ridgeway
Tel.: 301/286-7398

63. Automation of Logistics Engineering Change (LEC) Processing Procedures to Provide Improved Management

Goddard Space Flight Center (GSFC)

Description of the Activity:

Launch Support Division's Material Management, Physical Distribution, and Systems Management and Control Departments joined efforts in automating management information and material flow processes of LEC material processed through the Depot of Networks activities. The automated process was designed to reduce or eliminate unnecessary handling, time consuming manually prepared logs, reduce material staffing time, and automate the authorized release of kits or component parts immediately upon receipt at the Depot. Material was previously moved from Receiving or Warehousing to the LEC Hold Area, assembled, manual records prepared, reports generated to report status and subsequent release authorization. Upon receipt of the release authorization, the LEC material was forwarded to Packing and Crating for reverification and shipment. After implementation of the automated procedure, LEC kit material is not

systematically selected for automatic release by material management personnel using on-line terminal access. The selection criteria can be based on destination, LEC kit identification, specific items within a selected kit, or any combination of destination, kit designation or specific item as the user requests or directs. Material is then moved directly from Receiving or Warehousing to Shipping with all reports on status generated by the computer.

Benefits Achieved:

Through this project the Depot and subsequently all support Networks activities were able to obtain increased visibility over staged LEC assets as well as a reduction in material handling and delivery time. Critical items can now be identified and processed for immediate delivery while the elimination of internal material handling processes for authorized release material has reduced material handling time in Physical Distribution by 40 percent.

Contact for more information:

Name: R. W. Bierwagen
Tel.: 301/286-7797

64. Development of Advanced Graphic Techniques

Goddard Space Flight Center (GSFC)

Description of the Activity:

We have developed a variety of multidimensional graphics techniques over the past 3 years to facilitate the analysis of satellite altimeter data. This effort was carried out in conjunction with the NSSDC and supported by the Director's discretionary fund. The system is now incorporated into the NSSDC Graphics System (NGS) and utilizes the NSSDC Common Data Format (CDF). The work has focused on the development of hardware and software to perform three-dimensional solid modeling of scientific data. We have purchased a state-of-the-art computer graphics workstation (Megatek Merlin), which includes solid modeling capability in firmware. This system is connected to a DEC Vax mainframe computer. In order to examine data sets which are too large for modeling on the workstation, ray tracing software has been written for the Vax mainframe and Massively Parallel Processor. Hard-copy images can be obtained from laser filmwriters or image cameras.

Benefits Achieved:

A number of successful scientific applications have already been achieved with this system. They include (1) The three-dimensional visualization of variations in the marine geoid using a mean sea surface from the SEASAT and GOES-3 altimeter measurements. Animated sequences of sea level variations as observed with satellite altimeters. These studies are being carried out to facilitate the examination of propagating oceanic disturbances such as plantary waves. (2) Merging of scalar surfaces onto three-dimensional objects. This analysis is being developed to understand correlations between different data sets.

Contact for more information:

Name: C. Koblinsky
Tel.: 301/286-2280

65. Elimination of MAG Tape Utilization in Engineering Directorate's Manpower Process (KERMIT)

Goddard Space Flight Center (GSFC)

Description of the Activity:

Electronic transfer of manpower data is now possible from a VAX computer to an AMDAHL (IBM compatible) computer by using the ROLM phone system, KERMIT software, and a PC. In the previous procedure, data were being transferred from a VAX to the AMDAHL by magnetic computer tape. The data were entered from a number of sources into a VAX computer. A magnetic tape was then created on a VAX in Building 11 and walked to Building 18, where it was mounted on a tape reader and the file was copied onto the AMDAHL computer manpower data base. This procedure could take half a day or more if the tape could not be read. By electronically transferring the data, one knows in minutes if the file is correctly created on the AMDAHL computer.

Benefits Achieved:

Faster transfer of data between the Computer Services Branch and the Engineering Directorate. More efficient transfer of data; in the past compter tapes have been lost or were unreadable. The retransmission of data can now be done quickly and easily. Manpower reports can be printed with dispatch from the AMDAHL because the data are transferred to the computer faster and more reliably. The walking requirement has also been eliminated.

Contact for more information:

Name: Roland Ridgeway
Tel.: 301/286-7398

66. Micronet-8 Message Processing Terminal Upgrade

Goddard Space Flight Center (GSFC)

Description of the Activity:

Two Micronet Turbo-8 Message processing terminals and associated peripheral equipment, replaced two Micronet-8 terminals. All upgraded equipment and maintenance is on a lease arrangement with TRT Telecommunications. Both terminals are used to process Nascom Network and commercial refile messages.

Benefits Achieved:

Message traffic costs have been reduced because of new software programs and editing features. Archiving and message storage/accountability has been improved. Also, two commercial tielines and one TWX line were eliminated resulting in cost savings with no impact to operations.

Contact for more information:

Name: Bernie Tomardy
Tel.: 301/286-8089

67. Computer-Aided Drafting for Architectural Floor Plans

Jet Propulsion Laboratory (JPL)

Description of the Activity:

The Facilities Engineering and Construction Section maintains a set of approximately 300 floor plans of JPL buildings. These are regularly updated and widely distributed at a scale of 1 inch to 20 feet for use in space planning and area allocation. Historically, these drawings were prepared and revised manually, photographically reduced, and printed. Floor plans are now generated with Computer-Aided Drafting (CAD). They are stored and updated on the CAD system and directly plotted at the standard scale. Floor plan data can be entered into the system with dimensional accuracy in "layers" to facilitate future applications.

Benefits Achieved:

The CAD system has reduced the cost and time required for updating the scale floor plans by avoiding the photographic reproduction process. Cost savings have also resulted by eliminating the need to periodically redraw the original vellums that become worn and discolored from frequent revision and handling. Drawings produced on the CAD are more accurate and legible than those generated manually.

Contact for more information:

Name: William York
Tel.: 818/354-4890

68. Information Processing Center (IPC) Report Distribution System

Jet Propulsion Laboratory (JPL)

Description of the Activity:

The Information Processing Center (IPC) has implemented a system for Lab-wide distribution and tracking of reports produced on IPC laser printers. The system utilizes state-of-the-art technology to automate day-to-day report distribution functions. It separates system outputs into individual reports with complete distribution instructions

and has the capability of building or grouping together multiple reports for single or multiple destinations. The system tracks the progress of reports through printing and distribution and maintains historical data for use by management.

Benefits Achieved:

The IPC Report Distribution System uses software on an IBM mainframe computer which has reduced the time required for distribution of JPL financial reports and significantly reduced manpower requirements. Laser-produced reports may now be bundled together automatically as one contiguous unit for distribution, thereby reducing the requirement for skilled technical personnel to be available for report distribution. Under the manual system, report distribution during financial month-end processing required 7 days and involved three shifts of IPC data technicians and four analysts from Financial Planning. Implementation of the new system has reduced IPC report distribution manpower requirements by 50 percent and eliminated the need for distribution assistance from financial analysts. It has resulted in a reduction of approximately 960,000 report pages per year.

Contact for more information:

Name: John Meenan
Tel.: 818/354-8236

69. On-line Troubleshooting Data Base

Jet Propulsion Laboratory (JPL)

Description of the Activity:

The Data Processing Operations Group has implemented an on-line troubleshooting data base using the JPL electronic mail system (JEMS). This data base contains descriptions of anomalous data system performance, the cause, and operational workarounds or remedies to correct the anomalous performance. Hardware, software, and procedural problems can be addressed by this data base technique. When a problem is encountered with the real-time data system, the system controller can access the troubleshooting data base and display problem descriptions and corresponding corrective actions on a terminal.

Benefits Achieved:

Use of this technique for handling data system problems has greatly improved response times and provided consistency in corrective action procedures across all shifts. New problems encountered are categorized, described, and added to the data base at the time of occurrence, thus providing information for controllers on the next shift.

Contact for more information:

Name: Lloyd Jennings
Tel.: 818/354-1111

70. Review Process Enhancements

Johnson Space Center (JSC)

Description of the Activity:

The Propulsion and Power Division is responsible for eight Shuttle subsystems. Failure Mode and Effects Analysis (FMEA) data and Critical Item Lists (CILs) are maintained by Rockwell International on computers using "Word Perfect" software. In order to streamline the FMEA/CIL review process, the Rockwell computer disks are provided to the JSC Subsystem Manager who uses a utility program to convert the Rockwell information to "Word Star" software. Through the use of personal computers and the converted disks, the CIL pages are displayed during review meetings. Changes to the CIL are entered into the computer for display and discussion. If the reviewers have sign-off responsibility for the CIL, no further review is required and the output of the meeting produces the final version of the CIL. This procedure allows hard copies of all reviewed CILs to be distributed to all meeting participants. The conversion process is subsequently reversed to provide Rockwell with the revised CILs which are ready for incorporation into their system.

Benefits Achieved:

Because of a shorter and more effective review process, manpower is saved. In addition, final versions of a CIL are available in real time and accuracy is increased because changes are made while reviewers are present.

Contact for more information:

Name: John Norris
Tel.: 713/483-9027

71. Uniform Systems Training Model

Johnson Space Center (JSC)

Description of the Activity:

NASA's Automated Information Management (AIM) Council is systematically sponsoring the development and implementation of uniform systems to increase productivity. Training and education for these uniform systems were needed to develop awareness of new technology and benefits, to acquire skills required by new technology, and to apply new skills to daily work quickly and productively. JSC, through the Data Processing Systems Division (DPSD), was assigned to develop a plan to train employees for future uniform (agency-wide) systems and to prototype training materials for the NASA Payroll/Personnel System (NPPS) under development at JSC. After the Uniform System Training Model (USTM) was completed by DPSD, it was presented to and approved by the AIM Council. The prototype training materials were developed and used at JSC for training users of the prototype NPPS at JSC and then evaluated and approved by the NASA centers' training officers in September 1987. The USTM will be incorporated into the AIM Program Plan. The development of training materials for the productional NPPS is underway and will be used to train employees at each NASA center as each implements the NPPS.

Benefits Achieved:

The Uniform Systems Training Model will reduce costs to develop and provide training for uniform systems. It provides a standard methodology for developing training materials for future AIM uniform systems and will reduce the time necessary for employees to become productive in the use of AIM uniform systems.

Contact for more information:

Name: Josephine Jue
Tel.: 713/483-7599

72. Improved Procurement Methods

Kennedy Space Center (KSC)

Description of the Activity:

Procurement committed over $21 million during FY 1987; a 133-percent increase over FY 1986 with only a 16-percent increase in manpower. This was accomplished by improved management techniques, reorganization of departmental responsibilities, establishment of commodity procurements, use of blanket purchase orders, enhanced computer systems, and maximum use of Corporate Pricing Agreements (COPA).

Benefits Achieved:

Among the benefits realized were increased buyer's technical knowledge about specific commodities, improved Small Business/Small Disadvantaged Business participation, and a consolidation of purchases of similar items that lowered the overall cost by increasing quantities.

Contact for more information:

Name: Jim Gildersleeve (McDonnell Douglas Astronautics Company)
Tel.: 407/853-5354

73. Uniform Quality Assurance Program Established at KSC

Kennedy Space Center (KSC)

Description of the Activity:

In October 1987, an Internal Management Instruction and three Quality Assurance Directives were released which established a uniform quality assurance program at KSC.

Benefits Achieved:

Prior to these directives being issued, the three major Quality Assurance organizations were using different methods, different documentation, and different criteria for performing their Quality Assurance functions. With the newly instituted QA Directives, a more positive methodology has been instituted relative to performance data, deficiency

reporting, etc. Additionally, with uniform methods of data gathering, trend analysis, i.e., trending will now be instituted relative to the quality of the three major contractors at KSC.

Contact for more information:

Name: Raul Reyes
Tel.: 407/853-3392

74. AGCB Local Area VAXCluster

Langley Research Center (LaRC)

Description of the Activity:

The Local Area VAXCluster software is a product of Digital Equipment Company (DEC). This software, purchased during FY 1987 for $6,000, allows multiple VAX workstations (called "satellite nodes") to share peripherals through Ethernet. The operating system software for each machine is stored at a central VAX computer (called a "boot node"). This cluster system is the first to be operational at LaRC with two or more statellite nodes.

Benefits Achieved:

Storage of the operating system software in a common location on the boot node frees space for storage of user files on the satellite node. For the current AGCB system, a savings amounts to 30 percent Mb per satellite node. For the current AGCB system, a total disk space savings of 150 Mb has resulted. This is equivalent to two $4,000 DEC RD53 disk drives (71 Mb capacity each). The planned FY 1988 addition of two VAX workstations will save another 60 Mb of disk space over a declustered system. Additionally, system management for the entire maintenance costs will be reduced since discounts are typically given for clustered systems.

Contact for more information:

Name: P. Douglas Arbuckle
Tel.: 804/865-3934

75. Automated Reimbursable Tracking and Billing System

Langley Research Center (LaRC)

Description of the Activity:

Monthly obiligations, costs and disbursements at job order, program year, fund source and method of authorization level are downloaded from the accounting system maintained on the mainframe computer to a PC. Reimbursable agreement data is input manually to the PC. The data base (dBASE III) files are linked by similar fields to produce various reports on the status of reimbursable orders. Reimbursable billing is based on data in the data base and on options selected by the operator. Continuous preprinted forms based on the standard "1080" form are used for bills. Collections for reimbursables are also recorded through this system. Outstanding bills, bills register, and cash receipts register for

reimbursable orders are also produced from the system. Monthly journal voucher entries are produced on floppy disk for entry into the General Ledger System and the monthly Reimbursable Obligation and Cost Reporting System (ROCRS) is also derived from this system.

Benefits Achieved:

Approximately 5 days per month are saved in billing, receipts, and preparation of the ROCRS.

Contact for more information:

Name: Kenneth A. Frink
Tel.: 804/865-4924

76. Computer Production of Microelectronic Fabrication Masks

Langley Research Center (LaRC)

Description of the Activity:

Manual measurement and cutting of fabrication masks for microelectronic devices has been replaced by computer generation of artwork and roll-plotter cutting.

Benefits Achieved:

A reduction of 75 percent in time required to produce the initial mask. Any necessary changes can be accomplished in minutes or hours instead of days as with the manual method. The computer also eliminates the physical and visual fatigue associated with operating the manual equipment, thus significantly improving the ergonomics of the process.

Contact for more information:

Name: James E. Bartlett
Tel.: 804/865-2086

77. Extensive Use of Short and/or Urgent Card System

Langley Research Center (LaRC)

Description of the Activity:

The Work Control Office (WCO) initiated the extensive use of the "Short and/or Urgent" (S/U) card system. A phone call to the WCO for smaller tasks rather than submitting a Work Request (Form 69) reduces the documentation and review by a factor of 17 to 3. Normally, an average of 8,000 S/U cards are processed yearly. In 1987, approximately 10,350 S/U cards were issued.

Benefits Achieved:

In addition to increasing the productivity of assigned Production Controllers, an administrative cost saving of $130,000 was estimated. This system eliminates site visits, estimates, and the volume of paperwork required by the written Work Request (Form 69).

Contact for more information:

Name: W. C. Hogge
Tel.: 804/865-2032

78. Improved Method of Monitoring Crack-Growth on Fatigue Test Specimens

Langley Research Center (LaRC)

Description of the Activity:

An ongoing function of the Fatigue Research Laboratory is routine testing for fatigue characteristics of various metals, composites, and combinations thereof. Monitoring crack-growth propagation is an essential part of these tests. The acquisition of such research data is time-consuming and depends a great deal upon the skills, dexterity, and techniques developed by an experienced technician. Recently a technician devised a simple, yet effective, device which allowed much more stability during the critical phase of acquiring minute crack imprints for detailed studies with an electron beam microscope. Prior to the implementation of this suggestion, many sample attempts were performed before a suitable impression was acquired. Now, generally on the first attempt, a high-quality replica of the crack is produced, resulting in improved accuracy and reliability.

Benefits Achieved:

Implementation of this new method of acquiring fatigue crack imprints has resulted in consistently meeting or exceeding research test schedules. Previous methods required approximately 1 hour to obtain an imprint; the new method requires less than 15 minutes. Thus 2 man-hours per day savings are realized.

As this is an ongoing program, there is an annual savings of $7,000 in man-hours alone, not counting the improved accuracy of the research data achieved.

Contact for more information:

Name: William T. Howard
Tel.: 804/865-3050

79. Improved Nondestructive Evaluation (NDE) for Solid Rocket Motor (SRM)

Langley Research Center (LaRC)

Description of the Activity:

An NDE physical model of the Solid Rocket Motor (SRM) for the Shuttle was developed. Analysis of the model led to the ability to identify novel NDE techniques that have improved the ability to see buried delaminations in the motor structure. The technique requires that narrow band ultrasonic energy be sent into the motor at frequencies that correspond to resonances of the structure. At such resonances, the detectability of defects is significantly improved.

Benefits Achieved:

The time to develop NDE techniques for the buried delaminations in the SRM has been significantly reduced by identifying the correct approach to inspecting the motor. This information was shared with Marshall Space Flight Center and Morton Thiokol and is being built into a portable instrument at LaRC. The team at Thiokol was able to verify our findings and is modifying their approach to take advantage of these results.

Contact for more information:

Name: Joseph S. Heyman
Tel.: 804/865-3036

80. Method for Preheating Tunnel Circuit

Langley Research Center (LaRC)

Description of the Activity:

Traditionally, operations to control tunnel temperature in the "Air Mode" at the National Transonic Facility have been accomplished via the main drive to increase tunnel temperatures to a desired set point. Water is circulated through the cooling coils to reach stable and uniform control conditions. An innovative Tunnels Operations Branch technician suggested the use of the existing steam fired heater (normally reserved for the antifreeze system) to preheat water in the coils to above the desired set point, start the main drive, and stabilize heat load of the fan blades by adding water from the cooling tower.

Benefits Achieved:

The benefits attained using this method have been most advantageous. (1) Warm-up time has been shortened. Some tests had taken as long as 3 hours to stabilize conditions. Using the new method, 30 minutes has been the maximum time taken to stabilize conditions. For example, during the recent submarine and "priority tests," the models were restricted to a lower Mach number because of model design criteria which would not allow the fan blades to be turned at higher RPM. Normal warm-up time would have been very long. (2) Data can be obtained at very low Mach numbers (0.5). Using the old method, the fan blades would not stabilize conditions at very low Mach numbers. (3)

Electric power cost in the "air mode" amounts to $12,800/H.R. The time saved using this method is 2 1/2 hours, or $4,500 for each run. Approximately 100 runs were made last year in this mode for a savings of $450,000.

Contact for more information:

Name: T. E. Deans
Tel.: 804/865-2546

81. Mobile Remote Manipulator Vehicle System

Langley Research Center (LaRC)

Description of the Activity:

The Mobile Remote Manipulator Vehicle System (MRMS) is a logistics platform conceived to enable the construction and maintenance of Space Station and/or similar spacecraft. It transports and supports two astronaut positioning "arms" and an RMS (or similar) arm for positioning large "payloads" which are attached by astronauts. The MRMS can move in any direction on the Space Station truss without requiring tracks, remaining connected at all times to four structural hardpoints. Studies subsequent to the patent award have identified methods for transversing outside corners of a truss permitting operation on different sides of a truss beam or platform structure.

Benefits Achieved:

Development of the MRMS concept represents an enabling technology and, consequently, was selected as baseline for Space Station construction. Selection of the MRMS as the station logistics vehicle has permitted the early maturing of structural designs and construction techniques with significant cost reductions.

Contact for more information:

Name: Martin M. Mikulas
Tel.: 804/865-2551

82. NTF Fan Blade Pin Bearing Retaining Tool

Langley Research Center (LaRC)

Description of the Activity:

The removal, inspection and reinstallation of 25 delicate NTF Fiberglass Fan Blades was a very time-consuming process. Fan blade retaining pin removal was straight-forward; reinstallation, however, was difficult. Blade pin bearing sleeves alignment had to be precisely maintained during pin installation; any movement necessitated pin removal and repeating process. Several attempts usually were required to achieve proper pin position in hub. Mechanical Equipment Support Section personnel designed, fabricated and successfully utilized a specialized fixture to maintain bearing sleeve position during pin installation.

Benefits Achieved:

Using the bearing sleeve retainer fixture resulted in reduced installation time, which contibuted to maintaining critical research schedules. Considerable man-hour savings were realized as proper pin position was achieved during the first attempt. With the new fixture, approximately eight blades per day can be installed. Without it, the average was two to four blades per day. This amounts to about $6,000 savings in man-hours each time the blades are reinstalled. Facility downtime is shortened by 1 week. Operational time in the cold mode is approximately $180,000 per hour.

Contact for more information:

Name: R. F. Graham
Tel.: 804/865-2592

83. Production of Polystyrene Microspheres for Laser Velocimeters in Wind Tunnels

Langley Research Center (LaRC)

Description of the Activity:

To fully gain all the advantages of the Laser Velocimeter system of flow measurement, it was determined that the air flow must contain particles that were spherical and monodisperse, as well as of a precise diameter. The critical aerodynamic characteristic is that the particle accurately follow the fluid flow, but also present a consistent light scattering effect regardless of orientation and provide an adequate signal. The precise diameter, spherical, monodisperse, relatively low density polystyrene particles were commerically available; however, the cost of these particles had made their use in large wind tunnels prohibitive. A method was developed to produce these particles at LaRC which reduces the cost to the point where the potential savings in operation of wind tunnels is possible. Increased data rates and reduced run times can be achieved by using the Laser Velocimeters and these particles.

Benefits Achieved:

The cost of the materials in 1 liter of polystyrene particles produced at LaRC is less than $1. If setup cost, labor, and overhead are added to the in-house production cost, the in-house cost is less than $100/liter compared to the commerical price of $4,000/liter. Since October 1986, it is estimated that the 14x22-Foot Supersonic Tunnel has experienced cost savings in excess of $40,000. The cost savings will be similar for other large wind tunnels which use laser velocimeters.

Contact for more information:

Name: Cecil E. Nichols
Tel.: 804/865-4641

84. Administrative Process Improvement

Lewis Research Center (LeRC)

Description of the Activity:

To support the complex and dynamic requirements of the Center's research and engineering community, constant improvement is needed in our administrative and professional support systems and operating procedures. Major thrusts include (1) Application of computer and communications technologies to reduce manual paper processing requirements. For example, Procurement has implemented a new automated Acquisition Management System to trace progress on procurement actions. Personnel has put in place computerized systems for a variety of applications, such as tracking competitive placement and other personnel actions, FTE estimating and tracking, Wage Survey management and tracking, and (2) Improving turnaround time for purchasing material and equipment. Examples include the new DAMES system for FEP/MIL ordering from GSA and DOD, and centralization of the Chemical Management System.

Benefits Achieved:

These initiatives are continuing to greatly enhance achievement of Center objectives. The Acquisition Management System has improved the timeliness of various steps in the procurement process, ultimately reducing the lead time in processing actions. The computerized personnel systems have improved the timeliness and quality of reports and forecasts for management use. The DAMES system has provided a fully automated ordering system for GSA/DOD stock items, reducing delivery time from 45-60 days to 7-20 days. Centralizing the Chemical Management System has reduced chemical procurement time by several weeks and has eliminated duplicate chemical purchases.

Contact for more information:

Name: David Steigman
Tel.: 216/433-2914

85. Development of Guide to Writing Purchase Requests

Lewis Research Center (LeRC)

Description of the Activity:

A handbook has been developed by the Purchase Quality Circle to assist employees in preparing their Purchase Requests (PR). This user friendly guide, entitled **"Unraveling the Mystery: A Guide to Writing PR's,"** covers definitions, regulations, preparation, tracking and authority for PR's under $25,000.

Benefits Achieved:

The guide will assist users in preparing Purchase Requests that can be processed as quickly as possible. A study by the Circle indicated that previous errors in preparation had resulted in processing delays of nearly 3 work weeks. With this Guide, users will be able to avoid requests for missing information; avoid delays in PR processing; hasten delivery of their requested item or service; and avoid causing delays in processing of concurrent PR's.

Contact for more information:

Name: Steven Fedor
Tel: 216/433-2144

86. Improved Planning Process for Implementing Product Assurance Requirements

Lewis Research Center (LeRC)

Description of the Activity:

An improved, expanded planning process and plan has been developed for implementing applicable safety, reliability, quality, maintainability and software product assurance requirements on the SS EPS Project. This included definition of Lewis Safety, Reliability and Quality Assurance (SR&QA) program interfaces, responsibilities, methods of accomplishing tasks and methods of reviewing contractor products. This document also served to guide delegation of tasks and is used by both the Office of SR&QA and the Space Station Project Office (SSPO) to accomplish SR&QA tasks.

Benefits Achieved:

This plan resulted in significant improvements achieved in the following areas: (1) responsibilities and mode of operation were more clearly defined for the SR&QA Office and for the SSPO for accomplishing SR&QA tasks; (2) major and minor task responsibilities for OSR&QA and for the SSPO were more clearly established; (3) reference documents for controlling the SS EPS Project were better defined; and (4) productivity was enhanced through better establishment of program interface relationships and an improved communication process.

Contact for more information:

Name: W. Mason
Tel.: 216/433-2330

87. Robotic Welding

Marshall Space Flight Center (MSFC)

Description of the Activity:

Implementation of robotic welding on the Space Shuttle Main Engine (SSME) continues to improve production flow. The use of vision-based sensors for Gas Tungsten Arc (GTA) welding to replace manual GTA welds, reported last year, have now been incorporated on five production robots.

Benefits Achieved:

The accomplishments have greatly enhanced the ability to make quality robotic welds in SSME production. More than 200 welds are now being welded by the five production robots. The flow time for one part alone was reduced by 90 percent.

Contact for more information:

Name: C. S. Jones
Tel.: 205/544-2701

88. The Hydrolaser Facility

Marshall Space Flight Center (MSFC)

Description of the Activity:

The "teach-a-model" software for the MSFC Hydrolaser (Automated TPS Removal) Development Facility was modified in 1987 for production use and has been installed in the Kennedy Space Center (KSC) High Pressure Wash Facility. The production hydrolaser process will eventually be integrated with other advanced MSFC automation techniques currently under development. An optical scanning system will assess hardware damage, as well as pinpoint areas requiring automated touchup stripping. Graphic simulation will enable programming of the robot process off-line, without interfering with ongoing cell activities. An abrasive recirculation system will economically recycle abrasives used in an abrasive process (for stripping not conducive to water alone).

Benefits Achieved:

The hydrolaser process installed in the KSC High Pressure Wash Facility will reduce current vehicle refurbishment costs by $53,000.

Contact for more information:

Name: M. L. Roberts
Tel.: 205/544-2717

89. Hydrocarbon Analyzers Operations

Stennis Space Center (SSC)

Description of the Activity:

The Gas Analysis Laboratory purchases compressed gases in cylinders to operate the hydrocarbon analyzers for monitoring Liquid Oxygen/Gaseous Oxygen systems. This requirement can be completely eliminated by converting site air in the lab to zero grade air by installing an in-line hydrocarbon trap and blending site nitrogen with hydrogen produced in the hydrogen generator located in the Gas Analysis Laboratory.

Benefits Achieved:

The benefits are a savings of material cost, improved support, and the elimination of the hazards associated with handling and connecting 2,500 psig compressed gas cylinders. The annual cost savings from implementing this project are $6,960 per year.

Contact for more information:

Name: George Nelson (Sverdrup Technology, Inc.)
Tel.: 601/688-1336

90. Reduction in Discrepancy and Correction Report Requirement

Stennis Space Center (SSC)

Description of the Activity:

One Discrepancy and Correction Report (D&CR) is written to document a discrepant system and another to document a discrepant component installed in the system. The system D&CR renders the system inoperative or "down," therefore the component D&CR is not necessary.

Benefits Achieved:

The quality assurance procedure was revised to reflect this suggestion, eliminating the need to process the extra D&CR. Annual cost savings from this project is $6,000 per year.

Contact for more information:

Name: George Nelson (Sverdrup Technology, Inc.)
Tel.: 601/688-1336

91. Technology Utilization Network System

NASA Headquarters (Code C)

Description of the Activity:

A 1985 study of NASA's new technology reporting system identified the following factors which negatively impacted the timely dissemination of NASA technology to the public and private sectors of the U.S. economy: minimum program staffing levels, insufficienct growth in new technology acquisition/reporting, lack of uniform reporting procedures, and inadequate communication among NASA and NASA-sponsored groups engaged in the technology transfer process.

The Technology Utilization Network System (TUNS) was conceived and developed to address these issues. TUNS is a productivity tool designed to make more effective use of limited NASA resources assigned to technology transfer, and to allow for quicker, more uniform, and more efficient information gathering for all aspects of contract administration relating to new technology reporting, and other technology transfer activities.

Benefits Achieved:

Specifically, TUNS provides custom developed software to standardize and expedite the reporting and evaluation of new technology resulting from NASA R&D programs, office automation tools to enhance routine office procedures, the sharing of information in the

NASA TU network through a repository of technical and program information shared locally and through communications to other locations nationwide, and more rapid and complete response to outside agencies and U.S. industrial firms regarding areas of NASA R&D development that are potentially applicable for secondary use.

Through these efforts, TUNS will increase the productivity of the NASA Technology Utilization network and increase the speed by which new technology is available to the public and industrial sectors.

Contact for more information:

Name: Leonard A. Ault
Tel.: 202/453-2119

92. A "Hotsheet" Tracking System for Expiring Funds

NASA Headquarters (Code E)

Description of the Activity:

A document containing pertinent information on contract actions which involve expiring funds is updated and distributed to all affected organizations during the last 60 days of the fiscal year. Nicknamed the "Hotsheet," it lists program office, appropriation number, dollar amount, unique project number (UPN), contract modification number, expiration date, date received, date obligated, responsible individual, and special notes. It is updated daily as the first order of business and datafaxed or handcarried to any and all organization which generate, process, or execute funding actions. These include NASA Program Offices, Project Managers for non-NASA tasks, budget analysts, contract specialists, and contractor administration. No action is taken on expiring funds unless it appears on the Hotsheet. As a result, everyone in the process is literally "reading from the same sheet."

Benefits Achieved:

Code EJ has responsibility for administering the NASA-Caltech contract for the operation of JPL which approaches $1 billion per year and includes over $300 million funds from other agencies. In spite of significant increases in management attention to and complexity of expiring funds transacted during the close of the fiscal year, no funds have been lost due to administrative delay or error. The potential for failure is great since projects may have multiple sponsoring agencies, each with their own internal deadlines to manage end of year funding. The Hotsheet has proven successful because all individuals are provided with the timely and accurate information required to do the job. Not doing so would have the potential of schedule slippage or reductions in scope for the technical effort involved.

Contact for more information:

Name: John Devlin
Tel.: 202/453-2500

93. Electronic Conference System for OSSA Space Station Advisory Committee

NASA Headquarters (Code E)

Description of the Activity:

An electronic Conferencing System (Notepad) was being used by an OSSA Space Station advisory committee for their committee interactions and discussions. In January of 1987, the format and structure of the advisory committee was changed. The change reduced the number of activities, and placed all "private notes" in one sector; enabling the administration to purge old material more efficiently and effectively.

Benefits Achieved:

Service to the system's users was enhanced, and cost to the Government was reduced to about $5,000 to $6,000 per month.

Contact for more information:

Name: John Devlin
Tel.: 202/453-2500

94. NASA HQ Development of a Patent Applications and Patent Electronic Data Base

NASA Headquarters (Code G)

Description of the Activity:

NASA Headquarters has the responsibility of agency management of the invention disclosures, patent applications, and patent docket. The docket consists of thousands of invention disclosures; approximately 350 patent applications; and about 3,600 patents. Some type of action occurs in perhaps a hundred or more of the cases each day. The manual record keeping system was no longer able to effectively function. Software was purchased from a vendor and a support contractor assisted in the entry of the records on a PC. Invention disclosures, "pending" patent applications, and all extant patents are now stored in the electronic data base.

Benefits Achieved:

The combined invention, patent application and patent docket is known as PATDOC. Through the application of a few key strokes on the PC keyboard, a record can be reviewed on the screen. Thus, information on the status of a case, ownership inventorship, type of use, title, etc., is instantly available. In addition, countless types of reports may be generated and PATDOC is being used to phase in computer general reports and eliminate the manual record keeping.

Contact for more information:

Name: Robert F. Kempf
Tel.: 202/453-2424

95. NASA Headquarters Completion of Second Phase of Procurement System Certification Process Within NASA

NASA Headquarters (Code H)

Description of the Activity:

The second NASA procurement system certification was made to the Administrator on June 29, 1987. The overall NASA procurement system is considered to meet the approved criteria for a complete and comprehensive system. This assessment is based upon a substantive review of the data and certifications submitted by each center and Headquarters procurement offices and on-site reviews conducted at the remaining NASA centers that were not reviewed in 1986.

Benefits Achieved:

The procurement system certification review process has resulted in a comprehensive awareness and improvement of the effectiveness of NASA's procurement system. Some centers are using the certification process as an indicator of training needs. It is also an effective means of exchanging innovative procurement techniques among NASA centers.

Contact for more information:

Name: Scott Thompson
Tel.: 202/453-8920

96. NASA-wide Reductions in Procurement Leadtime for Competitive Contracts

NASA Headquarters (Code H)

Description of the Activity:

In fiscal year 1987, NASA reduced procurement leadtime on an agencywide basis for all categories of competitive contracts over $25,000 in value. A number of ongoing initiatives contributed to this accomplishment, including procurement process analysis conducted by Headquarters during Procurement Management Surveys, the NASA Procurement Career Development Program emphasis on procurement training, and the continued implementation of the Procurement Management Technology Program which further automated the contracting process.

Benefits Achieved:

The benefits of reduced procurement leadtime are numerous. They include more efficient manpower utilization, reduced proposal preparation costs, and increased acceptance of the competitive acquisition process.

Contact for more information:

Name: Scott Thompson
Tel.: 202/453-8920

97. Improving the Program Operating Plan/Institutional Operating Plan (POP/IOP) Process

NASA Headquarters (Code M)

Description of the Activity:

An ad hoc Budget Working Group, composed of the Office of Space Flight (OSF), the Center Comptrollers, the Director of Program Control for the NSTS Program, and the Acting Director, OSF Resources Management, analyzed the current POP/IOP process to see if it could be made more efficient given the impending return to flight of the Space Shuttle and the great deal of management attention that requires. The revised process called for a single full POP/IOP review a year (in the late spring and summer) with an update to the current year operating plan in the early spring.

Benefits Achieved:

This change allows for more time to be focused on new start candidates early in the year, with a review by the Administrator in late April or early May. It also allows more time for Headquarters review of the budget recommendations and resolution between the centers and OSF, and between OSF and the Office of the Comptroller. It focuses the budget briefing to the Administrator on unresolved issues for decision after clearly outlining program content and major changes. It also allows for a formal reconciliation of program content with budget marks at the time the initial operating plan is developed. Finally, it frees management time for technical programmatic needs vice budget reviews.

Contact for more information:

Name: Alotta Taylor
Tel.: 202/453-2526

98. Computerization of Retirement Counseling

NASA Headquarters (Code N)

Description of the Activity:

The activity consists of the computerization of the retirement annuity computation process in order to prepare retirement annuity estimates to those employees potentially interested in retirement. The computer program developed through assistance by the Headquarters computer contract provides a hard copy summary of an employee's creditable service, high 3-year average salary, annuity estimates with any applicable reductions, and a survivor annuity estimate. The system can also provide a summary of other retirement options and financial data including computation of alternate annuity option and withdrawal of the employee's contributions to the retirement system, taxation of the withdrawal of the retirement contributions and retirement annuity, and total of the lump sum annual leave payment.

Benefits Achieved:

The retirement computation program has provided a mechanism for comprehensive counseling and advice to those employees potentially interested in retirement. The program provides hard copy estimates to employees in considering their retirement options.

Contact for more information:

Name: Benita Cooper
Tel.: 202/453-1030

99. Test Use of the Design/Build Procurement Method for Construction of a Large Facility for Lower Unit

NASA Headquarters (Code N)

Description of the Activity:

A $17,000,000 office building project at Kennedy Space Center (KSC) has been approved in NASA's FY 1988 budget. The Facilities Management Office is directly supporting and participating in the KSC effort to use the design/build procurement method in an attempt to increase building size within the congressionally appropriated $17,000,000 budget by as much as 50 percent. This increase in building size will further relieve the severe housing problem at KSC.

Benefits Achieved:

By combining the separate steps of architect-engineer selection, design, bid, and build into a single procurement, a contractor will both design and build the facility. This method is considered to assure compatibility between project design and construction teams to promote lower cost per square foot of building, thereby achieving a larger building for the same cost. It also places responsibility for design errors discovered in the construction phase on the contractor.

Contact for more information:

Name: Norman Willis
Tel.: 202/453-1982

100. NASA Metrology Information System (NMIS)

NASA Headquarters (Code Q)

Description of the Activity:

The NASA NMIS was established during 1987. This is an agencywide automated data processing system designed to maintain accurate calibration and repair data of all NASA test equipment.

Benefits Achieved:

The use of this single, uniform calibration system by all NASA installations provides for the agencywide control of standards and test equipment in a process which maintains measurement traceability to national standards.

Contact for more information:

Name: Felix P. Crommie
Tel.: 202/453-2642

101. Software Management and Assurance Program (SMAP)

NASA Headquarters (Code Q)

Description of the Activity:

All SMAP products and services developed during 1986 attained initial operational status in January 1987. These items include a software acquisition life cycle standard, a complete set of software product documentation standards, five software management assurance guidebooks, an electronic bulletin board for software, and a software technology newletter. These products and services were introduced, as an integrated whole, to the NASA community and industry association representatives at the first SMAP sponsored NASA/Industry Software Management and Assurance Workshop. During 1987, the life cycle standard was distributed to over 2,000 NASA and industry software personnel, the documentation standards were distributed to all NASA installations, several other Government agencies and were made available to industry through COSMIC. Two issues of the SMAP newsletter were distributed to over 2,000 NASA management and software personnel, and training courses were given at six NASA installations to a total of 560 NASA employees. Also during the year, the documentation standards were expanded and elevated to information system standards. Courses and guidebooks were developed on software cost management and the development of risk and prototype management guidelines have been initiated.

Benefits Achieved:

The availability of all this information and easy-to-use guidance material makes it possible for NASA projects to plan for, manage the acquisition of, and assure the quality of software capabilities.

Contact for more information:

Name: William M. Wilson
Tel.: 202/453-8679

102. Advanced Development Program

NASA Headquarters (Code S)

Description of the Activity:

Designing the Space Station demands advancement in specific application areas within a

broad spectrum of technical disciplines. Responding to these critical requirements, the Space Station Program implemented the Advanced Development Program (ADP), conducted during the Preliminary Design Phase, (Phase B) of the program. The ADP, a 3-year program coordinated among the NASA Offices of Space Station, Space Flight and Aeronautics and Space Technologies, engaged every NASA field center in some 150 discrete tasks distributed among 13 technical disciplines, such as thermal, power, structures, and data management. This program extended over a 3-year period and advanced technology from the generic NASA technology base, prototype development of ground-based test beds for Space Systems and development of flight experiments operations aboard the Space Shuttle.

Benefits Achieved:

The ADP extended NASA's knowledge of technology and hardware designs that would have specific application to the Space Station. A network of test beds at four NASA centers provides practical environments to test proposed hardware candidates for the critical systems of the Station. Significant precursor flight experiments have been and will be flown, which demonstrates, in the environment of space, how people will construct the Station, how materials will survive the rigors of space, and how critical new thermal systems will operate efficiently in the challenging environment of space.

Contact for more information:

Name: Paul G. Anderson
Tel.: 202/453-2373

103. Transportation Study

NASA Headquarters (Code S)

Description of the Activity:

To test assumptions about Space Station dependence on the Shuttle, a study was performed to identify and evaluate techniques for increasing the productive use of Shuttle resources during the Space Station era. The study included categorization of Space Station requirements, reevaluation of packing factors, and reassessment of both utilization and resupply strategies. It also involved investigation of the relative effectiveness of increasing Shuttle capabilities and of using unmanned launch vehicles for logistics-only missions.

Benefits Achieved:

Successful completion of the study enabled reduction of Space Station's dependence on the Shuttle fleet from eight flights/year to five flights/year. Based on a projected 12 flights/year following return-to-flight, this represents a 75-percent increase in Shuttle availability for non-Space Station uses.

Contact for more information:

Name: Paul G. Anderson
Tel.: 202/453-2373

104. Increased Use of Teleconferencing

NASA Headquarters (Code T)

Description of the Activity:

Within the Ground Networks Division, a significant increase in the use of teleconferencing with our field centers for information exchange and management reviews has been initiated.

Benefits Achieved:

The use of teleconferencing vice trips to the field centers for face-to-face meetings has reduced travel time as well as reduced travel costs to the Divisions.

Contact for more information:

Name: Robert M. Hornstein
Tel.: 202/453-2060

105. Creation of NASA Contacts System for Congressional Contacts

NASA Headquarters (Code X)

Description of the Activity:

The Congressional Relations Office, Office of External Relations, created and maintained a NASA Contacts System (NCS) on the Headquarters VAX computer. NCS is a data base that houses information on meetings, hearings, trips, floor speeches, and legislation introduced related to NASA. Information is keyed into the NCS by date, subject (keyword), congressional association (Member/committee name), NASA attendee, trip locations, issues (legislation introduced), and items presented. Reports can be generated either by name of attendee (Member or NASA), subject, date, trip location, issue, etc. NCS will quickly sort information and provide a report related to the query. The system is also capable of generating an overall report checking each field of the data base.

Benefits Achieved:

Use of NCS can replace the time-consuming and labor-intensive search through paper files for the above information. An NCS search will be quicker, more comprehensive and accurate. Since each record keyed into NCS also allows several lines of free text, the NCS may negate the need for searching for memos concerning the events targeted. NCS is also a strategy tool in planning for presentation of programs/issues to the Congress for favorable consideration. NCS is also a user friendly/menu driven system with minimum training requirements which provides easy access for all staff of the Congressional Relations Division.

Contact for more information:

Name: Lynne Murphy
Tel.: 202/453-1945

IV. NEW TECHNOLOGY/MODERNIZATION

106. Acquisition of Modern Equipment for the Production of Color Viewgraphs and Prints

Ames Research Center (ARC)

Description of the Activity:

In order to deliver high-quality color viewgraphs and prints at considerably lower cost to the Government, the Imaging Technology Branch's Photo Lab purchased and installed a Kodak Ektachrome Color Copier in January 1987. The cost of materials dropped from a $6.00/per sheet cost to a $1.00/sheet cost for color viewgraph materials. In addition, 8x10 prints that were contracted at a cost of $4.00 each are now made in-house at a cost of 68 cents each.

Benefits Achieved:

Actual cost savings of $81,200 were realized during the first 12 months of operation, which exceeded the acquisition cost by $20,000. An added benefit is the ability to turn around a RUSH order within 1 hour, if required.

Contact for more information:

Name: Roland P. Michaelis
Tel.: 415/694-5017

107. Computational Physics Analysis

Ames Research Center (ARC)

Description of the Activity:

New tools for more effective analysis of computational physics have been developed and applied in computational fluid dynamics research. The tools were created by combining high-performance computer graphics hardware, digital video recording hardware, communications hardware, and scientific visualization software. These tools permit the scientist to more rapidly create and analyze dynamic scenes that convey the key features of fluid dynamic simulations that have been performed on the supercomputers. The scenes can be quickly created and modified because of the computing power of the supercomputer, and the viewing and analysis of the screen during creation can be efficiently done with the special viewing hardware in the workstation. Special scene manipulation and video controller software permits the scientist to easily create video tapes for additional off-line viewing and presentations.

Benefits Achieved:

The main benefit is the more rapid and complete analysis of the highly complex data generated from the fluid dynamic simulations performed on the supercomputers. An additional benefit is a higher quality reporting of the research results to others.

Contact for more information:

Name: Val Watson
Tel.: 415/694-6421

108. Data Systems Upgrade for the High Reynolds Number Channels

Ames Research Center (ARC)

Description of the Activity:

A new Digital Corporation's micro VAX-based data acquisition and analysis system was added to the existing PDP 11/34 system in the Ames High Reynolds Channels in FY 1987. The new system consists of a high speed (1 MHz) A/D system, large data storage (1.7 gbytes), and Ethernet connectivity to both the facilities and the Ames network.

Benefits Achieved:

Improved operational efficiency of the facility has been increased by a factor of three. Data Acquisition speed is now 20 times faster; there is 400 times greater data storage capability; computation speed has increased by tenfold; and input/output throughput is 20 times faster. New features include multiuser capability, networking, and a color graphics display. This permits more efficient utilization of this national facility.

Contact for more information:

Name: George Mateer
Tel.: 415/694-6156

109. Development of a Remote Control Loading Device for Wind Tunnel Model Balance Checkouts and Flow-On

Ames Research Center (ARC)

Description of the Activity:

Prior to the buildup of a wind tunnel model on a balance, a validation of the balance calibration is required. In the past, wind tunnel balance checkouts were performed by physically placing a weight on a hanging pan. The Remote Control Loading Device (RCLD) will apply multiple accurate loads to wind tunnel balance from a remote location. Because of the safety aspects involved with loading a balance manually, it can take about 1 minute to set a load. Using the RCLD, a load can be set in about 10 seconds. With the emergence of flow through air balances, it became impractical to perform flow-on manual balance loadings, since each load point would take about 15 minutes. The RCLD load setting time is unaffected since a man-rated safety environment is eliminated during the loading operation.

Benefits Achieved:

The RCLD has an 80-percent time savings, compared to manual loading operations; prevents back and other related manual loading injuries; saves set-up time; and does not require a man-rated environment during loading operations.

Contact for more information:

Name: Andrew C. Roberts
Tel.: 415/694-6272

110. Electronic Mail System Connectivity

Ames Research Center (ARC)

Description of the Activity:

Ames Research Center depends on a multitude of electronic mail systems to communicate between internal and external network users. Digital Vaxmail, All-in-One Mail, IBM PROFS, NASAMail, Telemail, ARPANET SMTP mail UUCP, SPANET mail, and Bitnet mail are just some of the various major electronic mails that are accessed via the Ames network. Because the various electronic mail systems are not compatible with each other, an electronic gateway system was developed and installed at Ames. The software was written in "C" for portability and is currently installed on a Motorola 68020-based computer running the BSD 4.3 UNIX operating system. This system provides a totally transparent interface between the various electronic mail systems to the user. It allows the user to send and receive mail between any of the electronic mail systems while preserving all the normal functions such as forwarding notes, replying, sending copies, and requesting and receiving acknowledging receipt.

Benefits Achieved:

The various electronic mail systems in use at Ames are integrated. Electronic mail users are not required to learn to use more than one electronic mail system. There is a more rapid and transparent exchange of technical and managerial information between the various electronic mail systems.

Contact for more information:

Name: John Yin
Tel.: 415/694-4121

111. Real Time In-Flight Calculation of Aircraft Performance and Aerodynamic Lift/Drag Polars

Ames Research Center (ARC)

Description of the Activity:

A real-time technique for computing aircraft performance and aerodynamic lift/drag polars has been developed. This technique was based on the concurrent development of a net thrust algorithm and has achieved an in-flight accuracy of better than plus or minus 3 percent. A color-graphics plotting display was developed that can plot drag polars, aircraft specific excess power (P_s), and lift curves in real time at up to 60 times per second.

Benefits Achieved:

Immediate, accurate aircraft performance and drag polars are computed and displayed as the aircraft generates the data. This increases flight efficiency and productivity by allowing a fast post-maneuver evaluation of aircraft aero-performance, data quality, flight conditions, and maneuver technique. It gives the capability to do direct in-flight performance optimization and have immediate post-flight aero results.

Contact for more information:

Name: John W. Hicks
Tel.: 805/258-3301

112. Application of Very Large Scale Integration Technology to Telemetry Data Processing

Goddard Space Flight Center (GSFC)

Description of the Activity:

In 1985, Office of Space Operations and GSFC initiated a test bed program to apply Very Large Scale Integration (VLSI) technology to spacecraft command and data handling systems. Functions previously performed in software on general purpose computers and in custom-developed racks of equipment were implemented in programmable chips designed for common stages of telemetry processing. The goal was to increase the performance of telemetry processing systems to meet the data rate requirements of Space Station era missions and to reduce the cost and physical size of these systems.

Benefits Achieved:

The first prototype subsystem, a telemetry and command processor for spacecraft control centers, has been completed. This system, a card cage approximately 18 inches on a side, replaces equipment formerly requiring 3 racks. The prototype supports data rates up to 20 Mbps, a factor of 10 greater than the previous version, and can be reproduced for less than $50,000, one tenth the cost.

Contact for more information:

Name: John Dalton
Tel.: 301/286-8623

113. Computer-Aided Design for Complex Spaceflight Instruments

Goddard Space Flight Center (GSFC)

Description of the Activity:

The Atmospheric Experiment Branch of GSFC has recently implemented a computer-aided design package (AutoCad) for aiding in the design of the many complex spaceflight instruments to be flown on upcoming missions supported in the Laboratory for

Atmospheres. Among the instruments and missions will be the neutral gas and ion mass spectrometer/gas chromatograph instrument being developed for the Saturn entry probe/Titan mission (Cassini), and the neutral mass spectrometer on the EOS mission.

AutoCad is an inexpensive computer-aided design package that is loaded onto the individual scientist's and engineer's PCs for initial conceptual designing. The conceptual designs are then easily transferred to the mechanical designer's PC workstation which has larger monitors with higher resolution that aid in more detailed design. The final design can be easily reviewed and changed if needed. The drawings used for fabrication are then plotted on Hewlett Packard 7475 plotters and, for larger drawings, a Calcomp plotter.

Benefits Achieved:

Use of AutoCad has noticeably increased the productivity in the design area of our instrument development. Drawings that once took several weeks to complete are now taking only several days. It is of particular use when many changes occur during the initial design stages of a development effort. Now changes can be made almost instantaneously with the effect viewed immediately. The AutoCad computer-aided design package has proven to be a very useful and inexpensive design tool for our instrument development effort. Its features rival those on similar CAD packages costing several times as much.

Contact for more information:

Name: Stanley Way
Tel.: 301/286-3945

114. Enhanced ADP Support Achieved

Goddard Space Flight Center (GSFC)

Description of the Activity:

Significant dollar and paperwork savings for GSFC were acheived through mass buy of microcomputer hardware and PC maintenance and in the other ADP areas. Goddard replaced an old mainframe computer. An Amdahl 580/5840 computer was recently acquired to support Center administrative computing. The new computer supports the many new on-line systems recently developed with other elements of the Directorate. Installed with the new Amdahl was a strong computer security software package, Access Control Facility 2 (ACF2). ACF2, together with an active user training and followup program, will provide excellent security for our confidential administrative data bases.

Benefits Achieved:

In addition to the savings achieved in ADP areas mentioned previously, it also reduced the amount of paper produced. Through the cooperative efforts of our users and installation of state-of-the-art laser printers, we have reduced paper output by 500,000 sheets per month with budget savings of $130,000 annually.

Contact for more information:

Name: Joseph D. Barksdale
Tel.: 301/286-8652

115. Expert Nimbus Operations System

Goddard Space Flight Center (GSFC)

Description of the Activity:

The Expert Nimbus Operations System (ENOS) consists of an off-line post pass analysis system and an on-line, real time processing Nimbus Operations Spacecraft Health Intelligence Terminal, both of which were developed by the General Electric/RCA Government Services control center contractor. The system was developed on an IBM XT and replaces over 2,000 square feet of outdated telemetry processing equipment. All Nimbus 7 telemetry is checked continuously and results are presented to the flight control operators in a user-friendly, real-time mode. The system is truly transportable in that it can interface directly to NASCOM lines or a ground antenna and use with other spacecraft requires proper data bases with mission unique software developments, if any, since the system is driven by data bases.

Benefits Achieved:

The ENOS went into operation on October 1, 1987, with estimated savings of nearly $750,000/year through reduced maintenance and staffing. When combined with benefits of a prior system (CLOUDS - 1985), a total of 6,000 square feet are available to support new missions. In a non-tangible sense, spacecraft operations can be run at lower risk due to all data being checked continuously and alarmed when necessary.

Contact for more information:

Name: Mike Forman
Tel.: 301/286-9287

116. Flight Dynamics Orbit Products Generation Automation

Goddard Space Flight Center (GSFC)

Description of the Activity:

The routine determination of spacecraft orbits and generation of associated products such as spacecraft ephemerides, scheduling aids, acquisition data and spacecraft onboard orbit parameters historically has been a labor-intensive operation because of extensive numbers of variable input parameters and extensive use of magnetic tape interfaces both within and outside the Flight Dynamics Facility. This resulted in excessive numbers of initial run errors requiring a significant number of reruns. Since most (if not all) of the parameters requiring manual entry were derivatives of time, and since all Flight Dynamics production activities were now integrated on the same computers, a plan for automation of all labor intensive activities was developed beginning with the automated

job set-ups and submission and the reduction of tape utilization. This automation also currently includes job statusing and product delivery accounting and will eventually include varying degrees of automated quality assurance.

Benefits Achieved:

To date, results of the automation activity have been highly successful in terms of manpower savings, computer savings and reduction in tape utilization. In the orbit determination area, the weekly average hours for job set-ups for 38 orbit updates was reduced from 25 hours to less than one. Thirty-five other related job set-ups were reduced from 29 hours to 7. Job submittals and monitoring were reduced from 50 hours to 25. In aggregate, associated manpower changes have been reduced from 9 to 6 full-time equivalents per year. Initial run errors were reduced from 8 per week to essentially zero. For orbit product related activities, manpower support for the same type of activities has been reduced from 250 hours per week to 150. Errors per month on initial job set-ups were reduced from 232 to 18 (90%). Associated computer savings were reduced 75 percent by eliminating many reruns. Tape requirements were reduced by 7,000 per year within the facility by using disk interfaces between internal support groups. In addition, job status information is now automatically tracked which gives the current information on all product deliveries without relying on manual log entry.

Contact for more information:

Name: Gary Meyers
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117. Operator Positions and Subcontracts Eliminated

Goddard Space Flight Center (GSFC)

Description of the Activity:

The Expert Nimbus Operations System (ENOS) is a generic data-base driven hardware/software system tailored to analyze real-time telemetry for health and safety purposes for the Nimbus 7 spacecraft. It can interface to any NASA Communications network (NASCOM) line carrying Nimbus 7 data in Digital Data Processing System (DDPS), Deep Space Network (DSN) or SUE formats and provide full spacecraft visibility. Basic hardware consists of an IBM XT and an expansion chassis housing a variety of special purpose cards along with a printer and color monitors. The software system determines 200 spacecraft events, checks over 1,300 mode dependent limits, gives alarm conditions and has about 27 unique pages which include spacecraft status configuration displays, event changes, updated plots from beginning of pass, operator procedures for alarm conditions, and several subsystem outputs and operates at real-time data rates of 4 kilobites/sec. Additionally, it can acquire orbital playback data at a rate of 128 kbits/sec., store this data on disc, and analyze it with the real-time software on a frame-by-frame basis after the pass.

Benefits Achieved:

ENOS has enabled the Branch to excess several old computer systems (CDC 924's, CDC 160A's, LSI 670's) which were original equipment in the Meteorological Operations Control Center, and will result in substantial savings in costs of operating and maintaining the control center. In 1987, four operator positions and expensive

maintenance subcontracts have been eliminated, and further reductions are likely. In addition, Nimbus-7 operations now can be consolidated, freeing up close to 7,000 sq. ft. of control center space for new projects.

Contact for more information:

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118. Telemetry Data Processor Upgrade

Goddard Space Flight Center (GSFC)

Description of the Activity:

The purpose of designing and building a new Telemetry Data Processor (TDPlus) was to augment and eventually replace the existing TDP's. A Telemetry Data Processor is a device that receives digital bit streams of data from a rocket or satellite and converts this data into real engineering units and displays this data for use by the engineers and project scientists. The need came about when the existing Telemetry Data Processors (TDP's) could no longer handle the telemetry requirements for some of NASA's sounding rocket payloads. The new payloads had larger data frames and higher data bit rates than the old TDP's could operate. The TDPlus is built around a PC compatible computer instead of a dedicated microprocessor as the old TDP's were. This allowed fast software system development of the devicer. The software is written in 'C' language and is highly modular. The operating system program is popdown menu-driven and can be easily operated by any person with some telemetry experience without a written instruction book.

Benefits Achieved:

This effort has resulted in the development of a device that is 3-10 times faster than its predecessor, can handle a data frame of 8-32 times the size, is one half of the weight, is easier to modify, and costs less than half to build.

Contact for more information:

Name: David Massey
Tel: 205/544-1135

119. Use of Surplus Space Flight Equipment from One GSFC Project by Another GSFC Project

Goddard Space Flight Center (GSFC)

Description of the Activity:

The Payload Module (PM) for the Extreme Ultraviolet Explorer (EUVE) spacecraft is being developed at the GSFC. The PM requires an electronics unit, called the Pyro-power Switching Unit (PPSU), to enable pyrotechnics on the PM to be fired and certain heaters to be activated. The Electrical Engineering Branch (Code 733) is responsible for developing a PPSU for this mission, in a design which is capable of being used by

PPSU and was in the process of implementing it. Code 733 discovered that a unit which had similar capabilities to the PPSU had been developed for the COBE Project but, because of the COBE redesign, was no longer in use. A study was done to determine whether this package could be used to support the EUVE mission. It was determined that the unit could meet EUVE requirements and recommended that it be used in place of the unit under design. The Explorer Missions Project Office concurred and secured a release of the unit from the COBE Project, at no cost.

Benefits Achieved:

By using the COBE residual as the EUVE PPSU, we are able to obtain the hardware much earlier and save approximately $200,000 in fabrication, assembly, and test costs in a fiscal year.

Contact for more information:

Name: Donald Margolies
Tel.: 301/286-8984

120. Electronic Transfer of Hardware Design Models

Jet Propulsion Laboratory (JPL)

Description of the Activity:

Computer-Aided Design (CAD) was electronically linked with Computer-Aided Machining (CAM) to yield substantial savings in cost and schedule. Part files are transferred using the International Graphics Exchange System (IGES). Electronic transfer of three-dimensional models from the design room to programmers who produce the numerical control program that operate the multi-axes numerial control equipment has resulted in substantial cost and time savings.

Benefits Achieved:

Changes in the tool path of a conventional design drawing requires a redefinition of all entities of the drawing (e.g., circles, lines, holes, arcs); these must be located according to the layout of the drawing before the tool path can be reprogrammed. Drawings produced with a CAD three dimensional model include the location of all entities and the tool path can be reprogrammed directly from the model. Rotation of the model allows the programmer to select the optimum direction from which to begin generating the tool path for machining. It also reduces errors in that the same model is used for design and fabrication. When multiple parts are fabricated with a CAD model, they are essentially identical. It is estimated that electronic transfer of the CAD design model has reduced machine programming time from 20 to 50 percent.

Contact for more information:

Name: Lloyd Jennings
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121. Mission Operations Enhancement

Jet Propulsion Laboratory (JPL)

Description of the Activity:

An activity has been initiated to introduce advanced automation techniques in the Spacecraft (S/C) mission operation for three key engineering subsystems: Power, Guidance and Control, and Command and Data Subsystems. This involves (1) understanding the present process for monitoring the S/C engineering subsystems' health and performance, the determination of anomalies, and formulation of corrective actions; (2) automation of selected operations functions and expansion of present operations capabilities for multi-mission utilization; and (3) prototyping and demonstrating functions in as realistic an environment as practical.

Benefits Achieved:

Introduction of advanced automation techniques will facilitate the processing of S/C engineering downlink telemetry data and the analysis of S/C engineering subsystem performance, including trend analysis, diagnosis of anomalies, and determination of corrective actions. It will also improve the S/C sequence generation and validation process. The automation will enhance productivity of mission subsystem operators by improving their alertness and consistency. It will increase the technical response quality of personnel involved, both in timing and accuracy. It will allow a multi-mission operation to be managed by a small team.

Contact for more information:

Name: Khosrow Bahrami
Tel.: 818/354-9032

122. New System for Resource Allocation Planning

Jet Propulsion Laboratory (JPL)

Description of the Activity:

The JPL Data System Resource Allocation Process provides allocation plans with appropriate analysis for the utilization of Deep Space Network (DSN) and Mission Control Computer Center (MCCC) resources. The process includes requirements definition, allocation, conflict resolution, and production of allocation plans. It has been a labor-intensive process, lacking rapid response needed for quick-turnaround contingency studies. This system has now been semi-automated through development of Resource Allocation Planning Helper (RALPH) software that makes use of artificial intelligence, heuristics, mathematical programming, and interactive graphics. RALPH is coded with TREES, a language that features a dynamic tree-structure manipulation. Because it is totally "data driven" and has a highly modular architecture, RALPH software can be applied to a large class of resource and activity scheduling problems. It is a highly visible, interactive, quick response system that enhances science return in terms of mission events.

Benefits Achieved:

RALPH has enabled the Resource Allocation Process to improve scheduling from eight weeks to two years in advance of events. A 50-percent reduction in the length of weekly conflict resolution meetings has been achieved from production of more conflict-free schedules. Projects are now using the data base for their own planning, with resulting increases in consistency and savings in time and effort. Off-Lab users are able to access the system through electronic interfaces, eliminating time and communication difficulties associated with hard-copy exchanges. The Resource Allocation Process is now able to respond quickly to requests for mission contingency overviews. The System has saved an estimated 7,000 work-hours during the first year of its implementation.

Contact for more information:

Name: Norman Reilly
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123. Centralized Computer Operations/Computer Consolidation

Johnson Space Center (JSC)

Description of the Activity:

The Data Processing Systems Division (DPSD) recently completed actions to increase productivity and reduce costs related computer operations: (1) DPSD took action to consolidate two computers into a single computer. Prior to this technology upgrade, DPSD operated two Unisys 110 series computers in the Center Computing Facility (CCF). The older of the two computers (an 1100/82) was replaced with equipment that expanded the capacity of the newer computer (an 1100/92). The resulting configuration was a single 1100/94 computer which is more powerful than the sum of the two separate computers. (2) DPSD also finalized the centralized computer operations project (CCOP). The CCOP is a computer operational support system which allows for the remote operation and control of multiple host computers, thus significantly reducing computer operations manpower costs. At JSC, the CCOP Central Processing Unit (CPU) is connected to eight IBM or IBM-compatible host CPU's in four locations. The CCOP processor and remote operations consoles are located at an offsite facility. The support contractor, Computer Sciences Corporation, has completed this implementation with the dual result of extended computer support hours at a reduced staffing level.

Benefits Achieved:

The computer consolidation: (1) Reduced hardware costs--$10,852 monthly in hardware leasing and maintenance. (2) Reduced software costs--$3,312 monthly. (3) Reduced operations manpower--$15,667 monthly. (4) Release of approximately 1,000 square feet of raised-floor computer space. (5) A 25-percent increase in processing capacity.

The CCOP: (1) Reduced manpower requirements by 11 man-year equivalents/year with savings of $37,000 to date and estimated savings of $390,000 for each of the next 2 years. (2) Computer operations are now available 24 hours a day, 7 days a week for interactive users with minimal control personnel.

Contact for more information:

Name: S. Berthiaume
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124. Computerization of Biomedical Laboratories

Johnson Space Center (JSC)

Description of the Activity:

A computerized automation system has been initiated to streamline the collection, manipulation, and reporting of data for the analytical laboratories within the Biomedical Laboratories Branch. This involves computerizing the Biochemistry, Clinical, Microbiology, and Toxicology Laboratories. Implementation of the system is being performed in stages to accommodate changes in laboratory objectives and also to incorporate advances in software/hardware in a cost-effective manner.

Benefits Achieved:

The Clinical Chemistry Laboratories installed a Laboratory Data Management system that is interfaced with automated chemistry and hematology instruments. The system collects, collates, files and stores data, generates a single report, and documents all quality-control aspects necessary for accreditation by the College of American Pathologists. The Toxicology Laboratories have all five Gas Chromatographs and the Ion Trap Detector interfaced with IBM computers. The Hewlett-Packard Mass Spectrometer (MS) has its own data analysis system, and a recent "Chem Station" computer was added to allow data analysis while the MS is analyzing other samples. The Clinical Microbiology Laboratories have acquired computer stations that are being used for data management and preparation of reports. These changes will increase the efficiency of the laboratories by reducing errors, work time, and costs.

Contact for more information:

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125. Development of On-Line Small Purchases System

Johnson Space Center (JSC)

Description of the Activity:

The Procurement Operations Office has designed, developed, tested, and implemented an on-line Small Purchases System at the Johnson Space Center. The Small Purchases System provides an on-line mainframe computer networked processing system to aid procurement professionals in performing small purchase activities in a more efficient manner. This effort is the first step toward a Centerwide electronic purchase system.

Benefits Achieved:

The Small Purchases System has increased efficiency through automatic updating from the Small Purchases System to the current Integrated Procurement Management System which reduced paperwork, manual preparation, and manual system updates; and provided current on-line updates to the procurement status and tracking system. In addition, on-line forms storage reduces the need to maintain a large library of paper forms while on-line procurement statistics provide managers with a direct, real-time tool for managing workload data. The electronic transmittal of purchase requests to the contracting officer has provided a direct, real-time mechanism for the contracting officer to review, manage, and make buyer assignments.

Contact for more information:

Name: Al Cornelius
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126. NASANET Intercenter Systems Network Architecture

Johnson Space Center (JSC)

Description of the Activity:

NASANET, an intercenter backbone network that connects intracenter IBM Systems Network Architecture (SNA) networks, was designed and implemented in 1987. JSC played the lead role in the design/implementation agencywide. Using IBM's SNA Network Interconnect (SNI) protocol, NASANET provides two-way interactive access and two-way file transfer capabilities between the intracenter SNA networks while allowing each intracenter network to remain autonomous. NASANET is an agencywide resource to support all programs with intercenter links to SNA communications requirements.

Benefits Achieved:

NASANET provides interactive and file transfer capabilities for the entire agency. This greatly reduces the duplication of SNA "internetting" efforts/resources among agency programs and within agency programs. In addition, NASANET allows each intracenter network to remain autonomous. Relative to its vast capabilities, NASANET requires a small number of physical communications links between centers. All links are provided by the Program Support Communications Network. NASANET provides redundant paths between the intracenter SNA networks. Requirements for dial-up access between intracenter SNA networks is greatly reduced. NASANET is used to support Space Station, Shuttle, and Automated Information Management Systems programs.

Contact for more information:

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127. Computerized Production and Tracking System

Kennedy Space Center (KSC)

Description of the Activity:

The existing computerized tracking system has been expanded and upgraded to include production scheduling for the coming week, estimated completion dates, relative manpower allocations, work analysis of previous week, and an integrated repair parts inventory and tracking system. The system will also perform extensive field validation of entries and provide a table of valid options when erroneous data is entered. Hardware and software were identified and procured to upgrade a multiuser system. This system will feed information to the KSC Recall and Data System. The system will also be compatible with the NASA Metrology Information System (NMIS) upon its installation at KSC. Additionally, the system will be able to preprocess NMIS transactions at the front-end to reduce the burden on the mainframe and data switching network.

Benefits Achieved:

Benefits include computerized production scheduling, manpower allocation based upon workloads, analysis of work completed for efficiencies and productivity, repair parts tracking and inventory control, front-end processing to reduce burdens on mainframe and data switching network, and extensive field checking to preserve the integrity of the data base.

Contact for more information:

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128. Consolidation of Inspection and Analysis Operations

Langley Research Center (LaRC)

Description of the Activity:

Material analysis equipment, including spectrograph and defractometer and dimensional measurement equipment, including coordinate measuring and scanning electron microscope, have been linked together using a VAX mini-computer. The VAX has been connected to LaRC NET.

Benefits Achieved:

Data can be consolidated and evaluated automatically. This saves the time required to collate the data manually and reduces the possibility of inadvertent errors in transposition. Large complex operating programs are now used to gather data, saving up to 30 percent of inspection time on some operations. The data can now be transferred directly to engineering or researchers without previous delays.

Contact for more information:

Name: R. W. Lee
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129. Digital Acoustic Data Acquisition System

Langley Research Center (LaRC)

Description of the Activity:

Most of the acoustic data measured today are digitized and then analyzed on digital computers. Typically, the acoustic data from large tests are recorded in analog form and then, sometime after the completion of the tests, are digitized at specialized data-reduction facilities. In conjunction with LaRC's Instrument Research Division, a nine-microphone digital acoustic data acquisition system has been designed and developed. In the digital acquisition system, the output from each microphone is digitized, transmitted in digital form through a cable to a central location, and recorded on tape in a digital (PCM) format. The maximum sampling rate per microphone is approximately 12 kHz.

Benefits Achieved:

The greatest benefit of the digital acoustic data acquisition system is the real-time digitization of the data, eliminating the time and the cost of digitizing the data after it is taken. The digital data acquisition system inherently has a greater dynamic range (15 bit resolution) and less phase distortion than analog recording systems. Through a computer interface, the digital data can be easily accessed allowing modern data analysis to begin with little or no prior data reduction.

Contact for more information:

Name: William Willshire
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130. Distributed Computer System Enhances Productivity for Solid Rocket Booster Joint Optimization

Langley Research Center (LaRC)

Description of the Activity:

The research objective behind the development of this system was to reduce the time required for optimizing the Langley Solid Rocket Booster (SRB) joint design by using a network of computer workstations. The approach taken was to develop the software that would allow finite difference analyses to be performed of different computers in a network of MicroVAX workstations and send the results to a central computer in the network for optimization. After the Shuttle accident, NASA considered new designs for the SRB joint. As part of this activity, Langley researchers developed a concept which could be used if no modification of the current SRB joint proved feasible. Preliminary calculations of the Langley design indicated a significant weight penalty. In an attempt to reduce the weight, a formal optimization procedure was developed. PROSSS (Programming System for Structural Synthesis), a previously developed system of computer programs which combine structural analysis with an optimization program, was selected as the software tool. This system was modified for distributed processing by allowing one computer to control the optimization process while other computers worked in parallel executing the analyses.

Benefits Achieved:

The finite element model of the SRB joint, with over 2200 DOF's and 532 elements, was parameterized using seven design variables. A single structural analysis required 15 minutes. Since the finite difference approach was used to obtain gradients for each of the seven design variables, the total of eight analyses for each optimization cycle would require 2 hours of computer time. Five to seven optimization cycles were needed to obtain a converged design; thus, a serial approach required from 10 to 14 hours of computer time. By applying the distributed system on four computers, the time for obtaining optimization results of a new structural design was reduced from about 12 hours to about 3 hours. If eight computers were used then the time was reduced to about 1 1/2 hours. Reducing the computer time for a single optimization cycle by a factor of four (or eight) permitted the testing of many different optimization concepts and approaches. In addition, the reduction of the time required for a complete optimization theoretically permitted the evaluation of a new design a day. From a practical standpoint, the distributed capability nearly eliminated computer time as a consideration in the optimization of the joints.

Contact for more information:

Name: James Rodgers
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131. Minor Construction of Facilities Upgrade of Combustion Heated Scramjet Facility (CHSTF)

Langley Research Center (LaRC)

Description of the Activity:

Provision of a new higher pressure heat sink cooled burner pressure vessel and new cooled nozzle throat increased flight Mach number simulation from Mach 0.5 to 4 to Mach 0.5 to 6.5. The increased Mach number capability will allow both subsonic and supersonic combustion data to be acquired from a given set of engine hardware in the CHSTF without requiring removal and reinstallation in a separate high Mach number facility.

Benefits Achieved:

Since installation and shakedown occupy 30 to 50 percent of the time alloted to a given engine evaluation, elimination of the requirement for two facility installations increases the productive data time by 20 to 35 percent.

Contact for more information:

Name: G. Y. Anderson
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132. Runway Modification Identified To Minimize Orbiter Tire Damage During Touchdown

Langley Research Center (LaRC)

Description of the Activity:

An investigation was conducted to find a texture modification for the touchdown zones of the Shuttle Landing Facility (SLF) at Kennedy Space Center (KSC) capable of reducing the spin-up damage seen during landings there. The original runway is extremely rough and was designed to provide excellent wet friction characteristics and any modification must also provide adequate wet friction capability. Numerous tests at the Langley Aircraft Landing Dynamics Facility (ALDF) were conducted on a variety of textures with transverse grooves. During the tests, spin-up wear and wet and dry cornering friction were evaluated. Limited tests were also conducted on the SLF using the Langley Instrumented Tire Test Vehicle after a variety of modifications were made in a test area. The results of all the tests showed that an ungrooved, longitudinal corduroy texture cut with 4 1/2 blades per inch was preferred to all other modifications. Cornering tests showed the wet corduroy surface to perform 80 percent as well as the dry KSC surface at low speeds and 70 percent as well at high speed. These levels are determined to be adequate for vehicle control.

Benefits Achieved:

The implementation of this modification to the SLF will reduce the spin-up wear damage during touchdown to an acceptable level and wet cornering friction will be maintained at an acceptable level. The modification will allow a crosswind limit increase at present safety margins, or will provide improved safety margin at present crosswind limits.

Contact for more information:

Name: Robert Daugherty
Tel.: 804/865-2796

133. Scale Model Tests Guide Shuttle Net Arrestment System Development

Langley Research Center (LaRC)

Description of the Activity:

There are a number of landing sites designated for use by the Space Shuttle Orbiter and they are all within the capabilities of the orbiter. However, there is the possibility of landing anomalies that could lead to a hazardous runway overrun accident. A runway overrun has the potential of significantly damaging the orbiter and the possibility of injury or loss of crew. The objective of the research activity was to develop a net arrestment system to stop the Space Shuttle Orbiter with a minimum of damage if a landing anomaly resulted in a runway overrun accident. Shuttle Orbiter net arrestment tests have been conducted at the NASA Langley Aircraft Landing Dynamics Facility (ALDF) using a 1/27.5 scale model to analyze the net orbiter interaction. Approximately 120 tests have been conducted at simulated speeds up to 95 knots full-scale using five NETS of different geometries. Scale model testing has resulted in modifications of the layout of the energy absorbing system and the net supension tearaway system to minimize the chances of the net falling under the wing for some slower speed

engagements. Approximately 20 tests have been conducted using a net built to the geometric specifications proposed for use on the orbiter and these tests have indicated that no more than three vertical net straps will be caught by the nose gear and they will be broken for engagement speeds greater than 60 knots.

Benefits Achieved:

Scale model tests were used to study arrestment system design problems in lieu of much more expensive full size testing.

Contact for more information:

Name: Sandy Stubbs
Tel.: 804/865-2796

134. ERBNET

Lewis Research Center (LeRC)

Description of the Activity:

The ERBNET project team developed and implemented a high-performance local area network for the Internal Fluid Mechanics and Structures Divisions. ERBNET significantly enhances the computational capability of these organizations to manipulate, process, and interpret data from analytical codes and experimental testing. Connectivity and high-speed data communications were established between the LeRC central computing facilities, local high-performance graphic workstations, special-purpose computing equipment, and remote systems, such as Naval Air Station at Ames Research Center. In most cases, ERBNET provided capabilities where none existed previously. In other cases, ERBNET provided significant improvements over existing low-speed data links.

Benefits Achieved:

The project not only met its initial goals but also resulted in a vendor-independent prototype design that can satisfy the data communications needs of other organizations at LeRC. ERBNET represents a major improvement in communication between many different types of computer systems at Lewis. It replaces separate and different low-speed links with a vendor-independent and common method to remotely log in from one system to another and transfer files between any two systems. Having high performance and requiring the user to know only one set of commands provides an integrated environment from desktop personal computers all the way up to class VI and class VII supercomputers. It is expected that the ERBNET design will be replicated in other organizations with the local area networks becoming sub-networks in a LeRC-wide high-speed scientific computing network. The ERBNET project team has developed a coherent, modular, and flexible approach that not only satisfies the immediate computer network needs at LeRC but also anticipates and provides for the future growth in those needs.

Contact for more information:

Name: D. Whipple
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135. Engineering Process and Technology Improvement

Lewis Research Center (LeRC)

Description of the Activity:

The LeRC Computer-Aided Design (CAD), Engineering (CAE) and Manufacturing (CAM) system is the result of a major initiative to improve the quality and productivity of research support. Improvements in the quality, timeliness and efficiency of these services have a direct effect on the ability of the Center to remain at the leading edge of Aero-propulsion and space applications technology. Presently, there are 38 CAD, 15 CAE and 2 CAM workstations, and a wide variety of computer numerically-controlled machine tools in place at the Center. In addition, 26 CAD and 4 CAE workstations are networked into mainframe computers in the Research Analysis Center, allowing total electronic transfer and interchange of three-dimensional graphics that completely automates the analysis and design functions. Sophisticated software for a broad range of engineering and design applications (such as the NEVADA software which supports space applications through computer-aided analysis of thermal radiation) enables employees to take full advantage of the system. People development is also a critical element; for example, most new employees in the fabrication area come from co-op programs where they receive a thorough background in CAM equipment (vetran model makers have received extensive training to bring them to the higher level of knowledge now required).

Benefits Achieved:

CAD has provided significant benefits to design engineers and their R&D and project customers. Designer productivity is up at least 50 percent and customers are receiving higher quality and more accurate designs. CAE has achieved dramatic productivity improvements approaching eight to one on many jobs, and the interactive computer imaging has allowed completion of projects which could not have been done before. The computer operated machine tools are enabling us to do work of a type and quality heretofore impossible, and have demonstrated an exceptional degree of repeatability, accuracy and precision. Many jobs can also be done up to six times more efficiently.

Contact for more information:

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136. Lewis Information Management System (LIMS)

Lewis Research Center (LeRC)

Description of the Activity:

The first phase of LIMS implementation began in 1987 with over 300 employees being brough online as part of the pilot group. LIMS is planned as a Centerwide system providing users with the ability to access the information they need through their LIMS workstation. This extensive network will include an Ethernet Local Area Network (LAN) within each of the 24 LIMS buildings, allowing access to a variety of systems. LIMS will be completely menu driven. There are to be menus not only for the PC level operations but also for the user's shell up on the servers - the LIMS VAX Cluster. LIMS workstations

will provide a common keyboard, system menu and access paths. The LANs will also connect to a variety of shared peripherals, such as a laser printer, OCR, plotter, and a video projection system within each LIMS building.

Benefits Achieved:

LIMS will provide Lewis computer users a means of working more efficiently and effectively by providing access to virtually any computer service at the Center and some services beyond through a single workstation. LIMS is based on standard software and equipment (facilitating training and the communication of knowledge and information) yet allows the user to tailor the system to individual requirements. Standard applications include communications, word processing, spreadsheets, project management, programming, statistical analysis, graphics, data bases, and others.

Contact for more information:

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137. Payload Crew Training Complex

Marshall Space Flight Center (MSFC)

Description of the Activity:

The Payload Crew Training Complex (PCTC) Facility is a dynamic facility used for Spacelab training for the payload crew. Improvements are continually being made to increase productivity in every aspect of the services the PCTC provides. During the past year, an additional host computer system, a grid case computer system, a spacelab module mockup, a communication system, and additional simulators were added. A new host computer system was created by clustering a new VAX 8700 with a VAX 11/785 to add efficiency to the software simulators/models which aid in training the payload crew. The Spacelab Module mockup is a high-fidelity replica of a Spacelab full module with emphasis placed on crew interface items such as electrical system, stowage containers, racks, tools, and data display units with flight-like keyboards. A rack power supply provides flight voltages to support experimenter's engineering hardware, which will allow this hardware to be interfaced directly with the PCTC host computer system, thus alleviating development of interface software.

Benefits Achieved:

The computer clusters improved the operation speed of simulators by a factor of four. The new grid case computer system allows the PCTC to use flight software instead of writing the software code in-house. The communication system installed increased the data transmission speed by 20 percent on the network between the Huntsville Operations Control Center (HOCC) and other locations. The screen generation system decreased model development time for generating simulated graphics of science data displayed on the Spacelab video system.

Contact for more information:

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138. Space Station Mockup Area

Marshall Space Flight Center (MSFC)

Description of the Activity:

In response to the Space Station Projects Office, a full-scale mockup of the United States Laboratory (USL) module was designed and fabricated. The mockup area has now been fully updated and includes the United States Laboratory, the U.S. Habitability module, two nodes, a cupola, and access walkways. The building has also been updated with lights, curtains, slides, video tapes, paint, and a 30x60 foot United States flag for mockup display. Being modular in internal design, the mockups can be reconfigured to accommodate alternate payload and systems concepts. They demonstrate sound man/systems engineering principles in areas such as general layout, color, lighting, and crew restraints and will eventually accommodate the installation of manifested payloads from various scientific disciplines to provide an integrated environment which will influence design and training requirements.

Benefits Achieved:

The Space Station 1-G mockup area is used for engineering design studies for the Work Package 01 responsibilities. These mockups have encouraged innovative designs and have proven many design changes. They have been used to encourage organizational participation and comments, to support astronaut evaluations, public information, congressional and Headquarters briefings on MSFC activities, and to provide industry information.

Contact for more information:

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139. Equipment Procurement Statusing System

Stennis Space Center (SSC)

Description of the Activity:

Prior to implementing the equipment procurement statusing system, each department maintained its own report. This was basically a manual effort of varying formats and of little benefit from an overall perspective. One exception was the Technical Service Department (TDS) which used a computerized program that permitted easy updates and print-outs. This project consisted of upgrading the TSD system and expanding it to include all departments.

Benefits Achieved:

The automated computer statusing improves the method of tracking an expanded level of equipment procurement. Other benefits are that the report is now issued weekly, coordination with NASA is basically at one point instead of four, and the value of the report as a management tool is greatly enhanced.

Contact for more information:

Name: George Nelson (Sverdrup Technology, Inc.)
Tel.: 601/688-1336

140. Development of Science/RTOP, Engineering and Administrative Data Base

NASA Headquarters (Code E)

Description of the Activity:

Engineering developed a comprehensive technical data base that includes the basic descriptions of all MSAD-related apparatus, schedule of reviews, and key contacts within and outside NASA. Science/RTOP developed a complete listing of RTOP centers plus discipline summaries, including 3-year funding data, and a list of all P.I.'s and associated UPN numbers. The administrative portion of the data base consists of all action items assigned to MSAD, including the individual assigned the action and the due date.

Benefits Achieved:

The engineering-developed data base has enabled MSAD management to more efficiently and accurately develop hardware trade-offs and the tippling effects due to manifesting changes. The Science/RTOP data base has facilitated rapid answers to requests from various Members of Congress regarding the MSAD-related activities of various P.I.'s which can be retrieved by state, by institution, or by discipline. It includes appropriate information to enable the printing of mailing labels for each P.I. as well as a listing of publications by each P.I. The administrative portion of the data base allows the clerical staff to keep an accurate accounting, status, and followup of all action items assigned to MSAD. Prior to computerizing this activity, all action items were manually logged in, and various reports, such as listing of overdue actions, were manually prepared.

Contact for more information:

Name: John Devlin
Tel.: 202/453-2500

141. Resources Decision Support System

NASA Headquarters (Code E)

Description of the Activity:

The Administration and Resources Management Division (EP) of the Office for Space Science and Applications (Code E) designed, developed, and implemented a system for resources management, known as the Resources Decision Support System (RDSS). RDSS is a host data base from which tabular and graphical financial status reports are produced. RDSS relies on electronic input of data from the Comptroller, as well as work stations located in Code EP. RDSS is used to compare multiple plans against accrued cost data, to track and to assess the financial efficiency of the Code E program, and to project fiscal year end cost requirements.

Benefits Achieved:

The physical output from RDSS is used each month in the Code E program reviews, the General Management Status Review, and independently by Code E managers. All tabular and graphics reports are prepared overnight on the host computer and distributed within 12 hours of data availability.

Contact for more information:

Name: John Devlin
Tel.: 202/453-2500

142. Better Resources Increase Efficiency

NASA Headquarters (Code L)

Description of the Activity:

Public Affairs undertook a series of initiatives to provide better resources to increase efficiency.

Benefits Achieved:

A Pitney Bowes facsimile 8230 was purchased and installed to replace a Pitney Bowes facsimile 8100. This machine replacement has greatly increased the efficiency and productivity of the Headquarters newsroom. In addition, the newsroom issues anywhere from 2 to 8 news releases a week which must be telefaxed to some 40 news organizations in the Washington area. Using the old equipment, it required one employee about two to three hours to transmit each release. Using the new equipment, this task can be accomplished in less than 1 minute for each release. The same time savings apply when it is necessary to transmit lengthy reports or press conference briefing charts to all NASA field centers. In summary, the new equipment has resulted in some 6-24 hours savings per week in employee work time.

Contact for more information:

Name: David W. Garrett
Tel.: 202/453-8400

143. Nondestructive Evaluation Measurement Assurance

NASA Headquarters (Code Q)

Description of the Activity:

One highlight in Nondestructive Evaluation (NDE) has been in a new computational model of the physical structure of the Shuttle Solid Rocket Motor (SSRM) to select the best NDE technique for evaluating bondline defects between the steel case, the insulation, and the propellent. The physical mode disclosed that frequency windows exist through which the bondlines can be inspected with ultrasonics. The model was verified with experimental tests on SRM samples with defects and an instrument is being built to be tested at Morton Thiokol on one of the test motors.

Benefits Achieved:

The major benefit achieved has been the use of ultrasonics to penetrate through the SRM steel case to inspect the internal bondlines between the insulation/propellent and propellent/liner for debond.

Contact for more information:

Name: Harry Quong
Tel.: 202/453-2633

144. Computer-Generated Resources Authority Warrants

NASA Headquarters (Code R)

Description of the Activity:

The Office of Aeronautics and Space Technology continues to make evolutionary enhancements to the Automated Resources System which became operational last year. The system uses a relational data base which enables a multitude of users to access the data base and array either tabular or graphic displays for resources management purposes. The latest enhancement (completed in the fall of 1987) provides the capability for electronically generating resources authority warrants which are issued to the field centers on a continuing basis during each fiscal year.

Benefits Achieved:

This enhancement has reduced the clerical support time associated with generating these documents and has improved the quality control as a spinoff benefit.

Contact for more information:

Name: Sharon Foster
Tel.: 202/453-2706

145. Space Station Technical and Management Information System (TMIS)

NASA Headquarters (Code S)

Description of the Activity:

Design, development and deployment of the Space Station will take place over a 10-year period and will require the exchange of data and integration of information by thousands of civil servants and contractors working from locations all over the country and abroad. The challenge of avoiding redundancy, preventing inconsistency and assuring availability of information throughout the life of the program was formidable. The Space Station Program Office resolved the problem with the Space Station Technical and Management Information System (TMIS). TMIS is an integrated, distributed data storage and retrieval system. Through networks and terminals, it will provide everyone involved in the management of the Space Station Program access to all the engineering and management information produced in the program. In addition to data storage and

retrieval, it will also provide other automated services such as word processing and electronic mail.

Benefits Achieved:

The TMIS will improve productivity by centralizing the source of information, eliminating difficult, time-consuming searches for data, reducing duplication of effort and ensuring consistency. The productivity improvement will continue when the Space Station is operational since the TMIS will continue through the life of the program.

Contact for more information:

Name: John R. Garman
Tel.: 703/487-7100

146. A New Software Tool

NASA Headquarters (Code T)

Description of the Activity:

A new software tool designed to support the development of graphics systems for operational flight dynamics systems was completed in 1986, then applied to the development of the GRO and COBE ground support systems. The tool is designed to simplify and automate the formatting and generation of screens for the interactive graphics devices used for attitude support systems in the flight dynamics area. This tool, called the GES Display Builder, has been incorporated into the larger integrated set of tools called the Software Development Environment for flight dynamics.

Benefits Achieved:

On earlier systems, the generation of interactive graphics software could typically require 25 percent of the total effort (which translated to 5 to 6 man-years) of building one attitude support system. Early indications are that the new tool has cut the overall effort in designing, implementing and testing the graphics software at least by one-third, offsetting the cost of the tool development with the first application on GRO.

Contact for more information:

Name: Robert O. Aller
Tel.: 202/453-2019

147. Enhanced Office Automation

NASA Headquarters (Code X)

Description of the Activity:

In April 1987, the International Relations Division (Code XI) replaced its central word processing system with a minicomputer-based integrated office automation system, which now supports 38 user terminals in Code XI and the Defense and Intergovernmental Division.

Benefits Achieved:

Internal electronic mail has largely replaced NASAMAIL, hand-written notes, yellow telephone message slips, and "telephone tag" within the division. The division's NASAMAIL bill declined an average of $300/month after the system was installed. Ready access to the Headquarters mainframe has permitted continued development of the International Personnel Exchange System, an agency-wide DBMS-based system for the management of foreign travel by NASA employees and non-U.S. access to NASA centers.

Contact for more information:

Name: Peter G. Smith
Tel.: 202/453-8440

V. PRODUCTIVITY MEASUREMENT

148. Performance Measurement System

Ames Research Center (ARC)

Description of the Activity:

Super Helium on Orbit Transfer (SHOOT) project instituted a computerized performance measurement system on an IBM/AT using a commercially available software package (Task Monitor).

Benefits Achieved:

Allows biweekly tracking of schedule and cost. This has resulted in uncovering manpower shortcomings in two subsystems (Extra Vehicular Activity, Transfer Line) as well as two potential cost over-runs early in project.

Contact for more information:

Name: Walt Brooks
Tel.: 415/694-6547

149. Product Inventory System to Measure Productivity

Jet Propulsion Laboratory (JPL)

Description of the Activity:

The JPL Documentation Section measures productivity with a Product Inventory System involving specially tailored computer reports that enable section staff to monitor technical reports, document work in progress, and assist section management in planning for the future.

Benefits Achieved:

In addition to providing a means of monitoring technical reports, documenting work in progress and assisting with future planning, the system serves as a useful reference for both new and veteran staff.

Contact for more information:

Name: John R. Corbett
Tel.: 818/354-7495

150. Automated Nonconformance Processing System

Kennedy Space Center (KSC)

Description of the Activity:

The automated nonconformance processing system is a paperless system developed to provide a method for documenting, tracking, and resolving hardware and software nonconformances. The system is modeled after the existing KSC Problem Report and Corrective Action (PRACA) system using compatible information fields and processing methods. It makes use of related computerized information to reduce processing time.

Benefits Achieved:

This system streamlines the reporting of nonconformances and enhances related systems. It reduces document administrative processing time by automatically completing entries and by providing a medium where the record is available simultaneously to several areas and different phases in the task and document processing can be accomplished in parallel. Since the system is part of the Integrated Data System, it automatically provides real-time status updates. Inputs through this system append failure data of parts to the trend analysis data base for use by Quality Engineering, Sustaining Engineering, and Logistics Engineering.

Contact for more information:

Name: Larry Anderson (McDonnell Douglas Astronautics Company)
Tel.: 407/867-4782

151. Center Response to OMB Productivity Initiative

Langley Research Center (LaRC)

Description of the Activity:

The first category identified by discussions with OMB and NASA to develop formal productivity reporting data concerns scientific and technical publications. As the pilot activity, considerable time and energy was invested in creating a realistic reporting framework capturing already available data whenever possible. The end product is an extensive tracking of the OAST center's inputs.

Benefits Achieved:

With other areas to be subsequently reported as part of the OMB productivity initiatives, such as wind-tunnel testing data, this effort has been valuable from a lessons-learned effort to achieve the meaningful data required. Break out of the components of the total process involved such as printing, graphics, editing, and photography provided internally and by support contractors provides a fiscal year scorecard of reference.

Contact for more information:

Name: Andrew J. Hansbrough
Tel.: 804/865-2691

152. Resources Guide for Performance Measurement Published

Langley Research Center (LaRC)

Description of the Activity:

Based on personal experience as well as training conducted at both LaRC and Kennedy Space Center, Dr. Dennis C. Kinlaw published his **Resource Guide for Performance Measurement in NASA Work Groups.** This effort was funded by NASA Headquarters and the Langley Productivity Officer served as the contract monitor. Examples cited were from a small-scale measurement pilot exercise in two branches at both LaRC and KSC plus examples collected from conducting the 2-day Productivity Improvement and Quality Enhancement Seminars at both Centers over several years.

Benefits Achieved:

Agency supervisors have a relevant document in the elusive productivity measurement area which can contribute to their understanding of possible approaches. There are not many references available in the Government research and development sector and it is believed the guide will be a useful tool to those interested in digging deeper into practical applicators.

Contact for more information:

Name: William L. Williams
Tel.: 804/865-4700

153. Productivity System Improvements

Lewis Research Center (LeRC)

Description of the Activity:

A micro-based system developed in dBASE III Plus automatically consolidates information on productivity in processing actions such as Purchase Requests, Purchase Orders, invoices and others within the Financial Management Division. All productivity information is entered into the system by the individual employees in a user-friendly environment. The various productivity items are maintained and updated by the branch supervisor in a variety of formats (e.g., daily, weekly, monthly). The system transfers information through three levels of reports: employee, branch supervisor, and management.

Benefits Achieved:

Among the benefits derived from this system are the following: information is entered one time and is automatically transferred through all system report levels (employee, supervisors, management); productivity can be tracked at all levels; and information generated from the system reports is used to create productivity charts and graphs for presentations to management.

Contact for more information:

Name: A. Celestina
Tel.: 216/433-6363

154. Scientific and Technical Publications Productivity Improvement Program

Lewis Research Center (LeRC)

Description of the Activity:

In support of the President's Productivity Program, the Technical Information Services Division joined its counterparts at the other NASA centers and Headquarters in developing a measurement system for improving productivity in Scientific and Technical Publications. Considerable effort was then expended by the Division to apply the general guidelines to the operation at Lewis, resulting in a system by which our productivity can be measured for the President's Program.

Benefits Achieved:

The Center's strategy for improving efficiency, quality, and timeliness in the Scientific and Technical Publications arena will be accomplished by the streamlining of procedures, the implementation of automated equipment, and aggressively tracking publication progress through both the authors and the Technical Information Services Division. This system will provide one means of assessing the success of these efforts.

Contact for more information:

Name: G. Mandel
Tel.: 216/433-5783

155. Virginia Productivity Center Study

Marshall Space Flight Center (MSFC)

Description of the Activity:

Following MSFC's attendance at the Second NASA Symposium on Quality and Productivity, a decision was made to assess the current MSFC productivity improvement program and impact the current plan with the assessment results. This assessment would lead towards a baseline of the MSFC culture and would provide a better understanding of program responsiveness to all levels of the organization. This assessment would be accomplished by using an appropriate expert facilitator and incorporating the tools that he would propose to meet our objectives. Such a facilitator has been found and a grant will be issued to him through the Virginia Productivity Center to help us complete our assessment. Dr. Sink, who will head the team that will be conducting the study, will use an approach similar to that which has been successfully applied with many other organizations including the Department of the Navy. The approach incorporates such tools as the Roadblock Identification, Analysis, and Removal Technique (RIART), which is an action oriented, pragmatic approach to getting professionals proactively involved in

productivity improvement, and the Auditing to Improve Measurement (AIM) process, which is a diagnostic instrument (questionnaire) designed to produce appropriate measurement recommendations.

Benefits Achieved:

It is anticipated that the Virginia Productivity Center study will revitalize our productivity improvement program and provide a means by which the Center Strategic Plan can move from vision to reality.

Contact for more information:

Name: William Reynolds
Tel.: 205/544-9530

156. Computer-Based Analysis of Infrared Detector Array Performance Data

Ames Research Center (ARC)

Description of the Activity:

During FY 1987, a highly flexible and adaptable computer-based data analysis capability was brought into operation in the Infrared Detector Laboratory. This automation provides the capability of varying and studying the effects of the various input voltage patterns and out sampling options involved in infrared detector array operation. Based around a Sun 2/120 workstation and a Macintosh Plus smart terminal, the system represents a capability unique within the infrared astronomical community. The system was initially developed by Ames Support Service Contractor, Sterling Software, to support testing of 58 X 62-element Si:Sb infrared detector arrays under simulated space astronomy conditions. The system has been named CAT (Computerized Acquisition Terminal).

Benefits Achieved:

The CAT system has allowed us to collect and analyze substantially more IR array data in a shorter period of time. In addition, since it is software-configurable, new types of tests, which were not anticipated in the initial test planning and CAT design, can be conducted in a quick manner.

Contact for more information:

Name: Craig McCreight
Tel.: 415/694-6549

157. Flight Dynamics Facility (FDF) Electrical Power Configuration PC Program (POWER)

Goddard Space Flight Center (GSFC)

Description of the Activity:

The FDF electrical panel configurations are now being maintained as a data base on a Personal Computer (PC). The application software for the PC was developed under contract by Bendix TDG/OES. The program produces a graphics power panel layout that identifies each device connected to the panel and pertinent electrical information, including circuit number, circuit breaker rate, and load average. The program has provisions for attachments where there are multiple devices on entire power panel and lists all the electrical connections from the load center to the panel.

Benefits Achieved:

Improved power configuration control and easy update of the data base. Improved production of new power panel tables and schedules when power reconfigurations occur and improved FDF operations during partial power outages.

Contact for more information:

Name: Charles McTavish
Tel.: 301/286-3592

158. Preserving Critical Skills

Johnson Space Center (JSC)

Description of the Activity:

In an effort to retain a selected group of well-trained, proficient engineers, certain supplemental program enhancement (SPE) tasks were authorized to be accomplished by the contractor, Rockwell, during the recent standdown period. Tasks identified as SPE's included: flight product enhancements; integration hardware management; improved requirement definition; improved drawings/methods for launch site installation; software requirements improvements; thermal analysis methods, models, and data improvements for operations; and loads/stress analysis models and data.

Benefits Achieved:

In addition to preserving critical skills which would have been difficult to replace, several benefits also have been realized through enhancements developed during the process. These benefits include improved thermal and loads models, the establishment of a software computer-aided design (CAD)/computer-aided manufacturing (CAM) data base to perform automated verification of flight products, conversion of mission unique technical orders to generic technical orders with mission unique modifications as delta on a CAD/VAX system, and creation of numerous engineering tools. In addition, contractor manpower was reduced (20 equivalent personnel (EP)) while accuracy and consistency have been increased.

Contact for more information:

Name: Larry E. Bell
Tel.: 713/483-1235

159. Closed Loop Repeatable Maintenance Recall System (RMRS)

Kennedy Space Center (KSC)

Description of the Activity:

A "closed loop" system for RMRS was developed which ensured the participation of Branch and Department Managers and pertinent directors. This system provided visibility to Branch Managers of what was delinquent (overdue) and of the anticipated workload the manager should expect (5 weeks in advance). The system also provided Department Managers and Directors insight into how each of their managers are handling the reduction of delinquent (overdue) items and planning the workload of each week.

Benefits Achieved:

The delinquent rate exceeded 10 percent before implementation of the "closed loop" system for RMRS. The delinquent rate has shown a steady decrease since the implementation; this rate reached 1.4 percent at the end of December 1987 or approximately 1,300 line items which were not available for mission support prior to the "closed loop" system are now available. Also, Branch Managers can better plan weekly activities so that the delinquent rate is not increasing.

Contact for more information:

Name: John Kulac (McDonnell Douglas Astronautics Company)
Tel.: 407/867-4959

160. Creation of Technical Data Processing System

Kennedy Space Center (KSC)

Description of the Activity:

The Technical Administration and Status Reporting System was established to provide a tracking and management system for Ground Support Equipment (GSE) Projects. During the brief period since its inception, the department has progressed from a time-consuming, hand-counted report to a sophisticated computer-generated endeavor. The department has developed comprehensive input data sheets and quality control forms to ensure accurate products. Through truly creative leadership, the system has been refined into an important management tool. Presently, the department is producing documents for use by all levels of personnel throughout KSC.

Benefits Achieved:

Administrators, Managers, and Engineers can now readily identify the progress of GSE projects, permitting them to make decisions relative to project priority and criticality. This identifying and tracking system has a very positive influence on project progress and implementation, thus enhancing the probability of meeting launch schedules.

Contact for more information:

Name: M. E. Baker (Lockheed Space Operations Company)
Tel.: 407/784-3092

161. Safety Action Line

Kennedy Space Center (KSC)

Description of the Activity:

To enhance the reporting of unsafe and/or unhealthy work conditions within the Shuttle Processing Contract (SPC), a safety action line was established and installed in the office of the SPC Safety Director. This enabled any SPC employee to directly communicate

hazards and safety concerns to the safety organization for expeditious closure. As a result of this activity, and the direct involvement of SPC employees in identifying hazards, many have been eliminated before the occurrence of an accident or incident.

Benefits Achieved:

The safety action line has allowed the employee work force to actively participate in an ongoing safety program. As a result, many hazards have been identified that may have gone undetected for a long period of time. The safety action line has helped us significantly reduce hazards in the workplace environment.

Contact for more information:

Name: Leroy Spivey (Lockheed Space Operations Company)
Tel.: 407/867-5570

162. VAX to PC Data Conversion

Kennedy Space Center (KSC)

Description of the Activity:

Numerous electrical calculations are routinely performed by the Electrical Design Engineering Department. These calculations are done to ensure the proper performance of the KSC Electrical System, and to protect the system by using the proper circuit breakers. In the past, these calculations were done manually using the information generated by the NASA Design Engineering VAX Computer System. This information was difficult to use because it required a manual search of 1,000 rows and 30 columns of data.

A method was developed to download the information from the VAX System to a PC. The information was converted into Lotus 1-2-3 and dBASE formats allowing the information to be sorted, scanned, searched, and manipulated in numerous ways to perform calculations and produce various reports.

Benefits Achieved:

The major benefits include the elimination of the time-consuming manual searching and calculation of data fields, improvement of data accuracy resulting from the elimination of human error involved in the manual processing of the information, and the ability to provide KSC electrical specification information in an organized format for quick reference.

Contact for more information:

Name: Steven Harris (EG&G Florida, Inc.)
Tel.: 407/853-2822

163. Development of a MACRO-11 Code Generator

Langley Research Center (LaRC)

Description of the Activity:

A Code Generator has been developed on the CDC CYBER to produce MACRO-11 code for the PDP-11/70 target computer from the HAL/S intermediate language HALMAT. The hardware/software upgrade for the Advanced Transport Operating System (ATOPS) project required the use of the high-level language HAL/S for software development. HAL/S is a language developed for flight software with natural mathematical expressions which include vector/matrix notation and bit addressability. A HAL/S syntactical analysis program provides error detection, listings of the HAL/S source, and an intermediate language HALMAT. The Code Generator uses HALMAT to produce a readable MACRO-11 source (including comments to correlate generated code to HAL/S source) which can be input directly to the MACRO assembler on the PDP-11/70.

Benefits Achieved:

Benefits of the Code Generator include better throughput on the CDC CYBER and improved MACRO-11 code with respect to the previous code generation system. The Code Generator executes on the CYBER and uses 60 percent of the CPU time with less than half the memory required by the previous system. The executable MACRO-11 code generated is improved by 35 percent and these improvements in the generated code allow for the consolidation of the tasks and the expansion of the ATOPS software.

Contact for more information:

Name: Roy Hamm (Computer Sciences Corporation)
Tel.: 804-865-1725

164. Tape Library Cleaning

Langley Research Center (LaRC)

Description of the Activity:

The goal of this activity was to cycle the magnetic tape library tapes through a cleaning process twice annually. The library consists of approximately 50,000 tapes. The cleaning function requires the total coordination of a three-shift operation utilizing various types of cleaning and degaussing equipment.

Goals were set and daily measurements were taken and reported on an objectives matrix so adjustments could be made to the operations to ensure these goals were being achieved.

Benefits Achieved:

The results of this endeavor were beneficial in that all goals were met on schedule. There were times when manpower resources could be reallocated to other areas if this function was ahead of schedule. Another primary benefit is that tape errors caused by contaminated tapes were kept very low when compared to previous periods prior to initation of this cleaning concept.

Contact for more information:

Name: Richard Miles (System Development Corporation)
Tel.: 804-865-2148

165. Consolidated Logistics and Administrative Support Service Productivity Program (Cortez III)

Lewis Research Center (LeRC)

Description of the Activity:

Cortez III corporation has a dedicated program for achieving quality and productivity enhancements. The program they have devised is heavily oriented toward employee involvement, since real productivity improvement cannot be made by management alone. Aspects of this program include an employee quality and productivity improvement suggestion program (47 suggestions were accepted from October - December 1987.); Quality Circles, which have addressed such issues as improving telephone service, developing more efficient work area layouts; Productivity Action Teams, whose assignments are assigned by management; Management Training Programs; Employee Training Programs; Productivity newletters; and a gainsharing program whereby 100% of the contractor's earned productivity fee is distributed directly to the employees.

Benefits Achieved:

These programs have resulted in a focus on continuous quality and productivity improvement within the organization. Examples of specific improvements include: reduced overtime through improvements in effective cross-utilization of personnel; improvements in timeliness and accuracy achieved through the automation of data for calibration of pressure transducers; and many others.

Contact for more information:

Name: E. Elleman (Cortez III Service Corporation)
Tel.: 216/433-8055

166. Hardware Maintenance Consolidation

Marshall Space Flight Center (MSFC)

Description of the Activity:

Twenty-two MSFC hardware maintenance and sustaining engineering contracts were successfully consolidated during 1987. This was accomplished by reorganizing the effort into two administrative areas--hardware maintenance and sustaining engineering. The maintenance staff was pooled into three groups: test, Huntsville Operations Support Center (HOSC), and central pool. This grouping provides a flexible pool of engineers and technicians to handle trouble calls, accommodating the limited access of HOSC and test areas.

Benefits Achieved:

We are maintaining the current computer hardware throughout the Center with a staff of 73 where the previous 22 contracts employed 85.

Contact for more information:

Name: Leroy Neece
Tel.: 205/544-5774

167. Development of the Computerized ACAS (Automated Corrective Action System)

Stennis Space Center (SSC)

Description of the Activity:

The Quality Assurance (QA) department has developed and implemented the ACAS, which provides timely information to management on problems and correction action status. Additionally, the ACAS serves as a computerized inventory of both Quality Assurance and Safety documented discrepancies.

Benefits Achieved:

An 81-percent reduction in open discrepancies and a 100-percent status of all open discrepancies being dispositioned has been achieved. This is a significant contribution to enhance quality.

Contact for more information:

Name: George Nelson (Sverdrup Technology, Inc.)
Tel.: 601/688-1336

168. Reduced Requirement for Gaseous/Cryogenic Testing

Stennis Space Center (SSC)

Description of the Activity:

SSC Standards addressed a general requirement for gaseous/cryogenic gas purity sampling. Sverdrup supervision submitted a detailed list of reasons stating that sampling to the general requirement was not necessary from a quality standpoint. The recommendation was reviewed by the Quality Assurance Department and incorporated in the Quality Sampling and Acceptance plan. This plan was approved by NASA.

Benefits Achieved:

The result was the elimination of approximately 150 samples/analysis, and a projected cost avoidance of $16,500 per year.

Contact for more information:

Name: George Nelson (Sverdrup Technology, Inc.)
Tel.: 601/688-1336

VII. CONTRACTORS - JOINT EFFORT

169. Civil Service/Contractor Teaming

Ames Research Center (ARC)

Description of the Activity:

In April 1987, Ames Research Center established the Ames Contractor Council to develop recommendations for uniform policies and practices specially designed to provide productivity improvement and quality enhancement among the Ames on-site support service contractors. A team effort between these contractors and their civil service counterparts is an integral factor in the effective accomplishment of the Ames Strategic Plan and mission goals. Current membership includes representatives from BAMSI, Bionetics, Computer Software Analysts, Calspan, Capitol Resources Management, G.E., IDG Architects, Mantech Services, MATSCO, Microsoft, Sterling Software, and Syre.

Benefits Achieved:

The Ames Contractor Council serves as a central focal point and collective voice of the Center's support service contractor work force. They work to assess and remove the operational barriers that impede the integration of civil service and contractor employees into one Ames work force within the legal and regularory framework. They look at the policies and "cultural practices" that adversely affect contractor performance and productivity, and recommend corrective actions.

Contact for more information:

Name: Robert J. Dolci
Tel.: 415/694-5214

170. Centerwide PC Maintenance Mass Buy Contract

Goddard Space Flight Center (GSFC)

Description of the Activity:

To reduce expenditures for microcomputer maintenance, the Center has developed and implemented a PC maintenance contract that presently covers almost 1,900 microcomputers. Through the use of a hybrid, fixed price/time and materials pricing system and the competitive, small business set-aside bid process, the current maintenance cost using this contract is only $64 per covered microcomputer system.

Benefits Achieved:

It is estimated that this approach will save the Center up to $3.4 million over 5 years. Using a single maintenance vendor offers both cost efficiency and improved quality control for the Center's microcomputer users.

Contact for more information:

Name: Joseph D. Barksdale
Tel.: 301/286-8652

171. Reliability Returns to Scientific Ballooning.

Goddard Space Flight Center (GSFC)

Description of the Activity:

The year 1987 likely will be remembered by the science community which uses balloons to fly instruments to the top of the atmosphere, as the beginning of a new era. Since the early 1980's, there had been sporadic problems with the reliability of balloons, particularly those in the heavy lift category. The problem reached crisis proportions by 1985 when failure rates were such that a moratorium was placed on all flights with balloon film manufactured by the company which for many years had been the principal source of scientific balloons. 1987 saw the fruition of efforts by the National Scientific Balloon Facility, NASA HQ, Wallops Flight Facility, and Raven Manufacturing to produce scientific balloons with high reliability. More than 30 successive flights were made without failure.

Benefits Achieved:

The timing was particularly fortunate for several scientific reasons. 1987 was the year of solar minimum. An expedition to Canada for various measurements of low energy cosmic rays was a complete success, with all four attending experiments obtaining good data. 1987 was also the year of supernova 1987A, and the new balloon capability was able to support a number of astrophysical flights observing the supernova from Australia.

Contact for more information:

Name: Dr. Robert E. Streitmatter
Tel.: 301/286-8292

172. Development of a Cryogenic High Electron Mobility Transisitor Amplifier

Jet Propulsion Laboratory (JPL)

Description of the Activity:

Through a cooperative JPL, National Radio Astronomy Observatory (NRAO), and General Electric research and development program, a Cryogenic High Electron Mobility Transistor (HEMT) has been developed. It is optimized for use at 1 to 10 GHz. JPL contracted General Electric to design and fabricate the device, while NRAO and JPL evaluated its performance. The best system implemented for the Very Large Array (VLA) has yielded an input noise temperature of 12.8 K at 8.4 GHz (the best maser has measured 3.5 K). Although HEMT receivers do not currently equal the noise performance of masers, they can be implemented at one-fourth the cost of masers and can be maintained for one-third the cost.

Benefits Achieved:

By the beginning of 1988, all of the VLA's 27 antennas will be equipped with cryogenic HEMTs (half are currently installed). It is estimated that when Voyager encounters Neptune in August 1989, the HEMT VLA system, together with the Goldstone complex, will have a sensitivity that is more than a factor of 2 greater than the Goldstone array alone. A 25-percent increase in number of images transmitted during near encounter is anticipated.

Contact for more information:

Name: Javier Bautista
Tel.: 818/354-6994

173. Reconfiguration Task Team

Johnson Space Center (JSC)

Description of the Activity:

The Mission Operations Directorate (MOD) Management Office has initiated a joint Space Transportation System (STS) operations enhancement effort under the direction of a MOD/Rockwell Space Operations Contract (RSOC) steering committee. As its initial improvement project, this committee selected STS reconfiguration operations and named a joint MOD/RSOC/Unisys task team to identify primary problems associated with the Shuttle Mission Simulator (SMS) reconfiguration process. The SMS is the prime flight training tool for the STS with flight-to-flight STS changes incorporated based on appropriate training requirements and/or mission scenarios. A 20-year old facility, the SMS requires major reconfiguration effort on the part of NASA and its prime contractor to ensure flight-ready training status. Based on input from the joint task team, a joint SMS Reconfiguration NASA Employee Team (NET) was established to define the accountability and responsibilities of the various elements in the SMS reconfiguration management process. The major accomplishment of this group was to document the eight basic steps/substeps with the inputs and outputs of the SMS reconfiguration process. The NET also identified 11 additional SMS reconfiguration problem areas and recommended solutions for management consideration/implementation.

Benefits Achieved:

As a result of the NET's efforts, a common SMS reconfiguration language/vocabulary has been established, providing better communication, interfaces, and understanding among the MOD and STSOC organizational elements in managing a major part of JSC training facilities. Additionally, this joint activity has validated the usefulness of the joint team approach in enhancing operation spanning various organizational elements. A follow-on NET has been named in the SMS reconfiguration process, and plans are underway to apply the team concept to the Mission Control Center reconfiguration process. Other potential areas for joint MOD/contractor improvement efforts are being considered.

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174. PIQE Seminar

Kennedy Space Center (KSC)

Description of the Activity:

The Productivity Improvement & Quality Enhancement (PIQE) Seminar which is sponsored and promoted by the KSC Productivity Council has been attended by over 900 KSC Government and contractor managers and supervisors. Four core sessions were covered over a 2-day period: (1) Productive Organizations and Superior Management Practices; (2) Getting People Involved; (3) Managing Change; and (4) Management as a Tool To Improve Performance.

A participant evaluation of the seminar was completed in early 1987 which resulted in significant changes to the content of the seminar. In addition, the theme of the seminar was brought in line with a current emphasis at KSC, Team Development. The "new seminar" has three core sessions: (1) The Role of Managers, Supervisors and Key Employees for Improving the Team Performance of Work Groups and Organizations; (2) Involving People To Improve Team Performance; and (3) Planning To Improve Team Performance. In line with the team development theme, the seminar has been opened to the natural work teams of supervisors and their nonsupervisory employees.

Benefits Achieved:

This, along with the joint participation of Government and contractor employees, provides a basis for finding ways to enhance the fulfillment of the common goals of the Government-contractor team at KSC. The KSC Productivity Council envisions the PIQE Seminar as a catalyst that will encourage managers and employees to integrate team development, quality enhancement, and productivity improvement initiatives into their ongoing management systems and activities which will result in improved organizational performance over the long term.

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175. Performance Action Team

Langley Research Center (LaRC)

Description of the Activity:

Three Unisys employees were assigned to a Performance Action Team. This effort was the first of its kind with both contractor and NASA personnel. The objective was to improve the quality of supplies received by the Analysis and Computation Division (ACD) through normal Stock Management procurement channels. This effort resulted in an analysis of how stock is purchased, frequency of purchase, and supplier selection. Additionally, the ACD requirements for these supplies were revisited to ensure accuracy and completeness.

Benefits Achieved:

The annual purchase order for printer ribbons and Varian paper was given to the vendor of each product. This reduced from 24 to 2 the number of purchase requests required. Communications among vendors, support personnel, and NASA Stock Management and Procurement personnel were greatly enhanced. Product requirements were fine-tuned to more accurately meet the needs of ACD. In addition, other groups outside ACD were actively participating on this team and improvements were made in film and lumber purchasing.

Contact for more information:

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176. Contract Quality and Productivity Improvement Incentives

Lewis Research Center (LeRC)

Description of the Activity:

In May 1987, Lewis Senior Staff chartered a team to work with both hardware and support service contractors to improve contract quality and productivity incentives. The team solicited input from more than 30 contractors in developing its recommendations. The project took several forms: (1) Developing Instructions to Offerors concerning quality and productivity improvement plans, incentives, and management. (2) Developing a Quality and Productivity Improvement Bonus Clause, including evaluation guidelines and ground rules. (3) Suggesting and coordinating Panel G (Contract Incentives for Quality and Productivity) at the NASA/Contractors Conference, where input on incentives was received from the more than 400 conference attendees. (4) Supporting NASA Headquarters in developing a primer on quality and productivity improvement incentives.

Benefits Achieved:

A better mutual understanding by NASA and its contractors of the issues involved in quality and productivity improvement incentives was achieved. The Quality and Productivity Improvement Bonus provides a means to reward specific quality and productivity efforts and accomplishments which result in tangible or intangible benefits to the Government in terms of quality, efficiency, timeliness, or effectiveness of the product or service. Because this clause is only one of a large menu of alternative contract mechanisms which can be used as an incentive for quality and productivity improvement, the Request for Proposal Instructions to Offerors requests that the contractors propose for evaluation and negotiation which incentive type they believe would result in the greatest benefits to the Government.

Contact for more information:

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177. MSFC/Contractor Workshop

Marshall Space Flight Center (MSFC)

Description of the Activity:

In preparation for the NASA/Contractor Conference, a 2-day workshop was held at MSFC with approximately 50 persons in attendance. Representation included civil service employees from MSFC and Headquarters as well as employees of 10 MSFC prime and mission service contractors. Formal presentations and informal discussions held during the workshop provided an ideal forum to share ideas and problems related to improvement. A wide spectrum of productivity programs and accomplishments were represented by the participating companies.

Benefits Achieved:

The stated purpose of this initial workshop was to determine the selection of speakers for the 4th Annual NASA/Contractor Conference. This purpose was fulfilled when speakers were determined by all in attendance--both civil service and contractor personnel. The benefits of the workshop, however, went well beyond this initial purpose. The workshop also served as a catalyst to those whose programs were not as developed as others and allowed some of the contractors with more advanced programs to share "lessons learned" with those whose programs were just getting started. Renewed efforts of at least two MSFC contractors can be directly traced to this workshop and the NASA/Contractor Conference itself. In addition, the need for further workshops of this nature was expressed by all attendees. As a result, similar workshops will be held in the future.

Contact for more information:

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178. Shuttle Projects Office Initiatives

Marshall Space Flight Center (MSFC)

Description of the Activity:

The Shuttle Projects Office and its contractors have initiated and continue to support a wide variety of programs to ensure continued improvement in quality and productivity. The Quarterly Reviews, which serve as a forum to exchange quality and productivity initiatives, were reinitiated in August 1987 when a speaker from the U.S. Forest Service gave a briefing on their efforts to reduce bureaucracy at a quarterly review held at the Martin Marietta Facility in New Orleans. The fourth update of the Productivity Improvement Plan was released May 1987. The plan identifies and describes both present and planned productivity efforts and activities at the MSFC and the prime contractor facilities. The Productivity Planning Group has been meeting regularly for more than 3 years to foster productivity initiatives and to disseminate productivity enhancement ideas. During the past year, an 18-minute employee motivational video production titled "Return to Flight" was produced by the Shuttle Projects Office to highlight the progress of each of the MSFC Shuttle Elements and the efforts required to re-initiate Space Transportation System (STS) operations. The presentation provides an in-depth look at both Government and contractor test/hardware redesign and certification activities,

featuring spokespeople from all levels of the organization. The production was designed for a wide-ranging audience to include all Shuttle Project Office and contractor personnel, as well as limited screening applications to the general public.

Benefits Achieved:

The continued emphasis on enhanced quality and productivity by the Shuttle Projects Office and its contractors is vital to the successful renewal of STS operations. The video tape provides documentation of efforts to achieve this goal.

Contact for more information:

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179. Increase in Active Employee Teams

Stennis Space Center (SSC)

Description of the Activity:

There are currently 19 active Pan Am teams. All teams must meet regularly, receive training and practice structured problem solving. Of the teams, five are Employee Action Circles that operate as classic quality circles. One is a Management Action Team (MAT) which is an integrated team consisting of both NASA and contractor managers. The balance of the teams are Performance Objectives Matrix Teams.

Benefits Achieved:

As of January 1988, 170 employees constituting 33 percent of project employees participate as team members. Projects implemented by the teams include reduction of valve failure rates in the Fluid Component Processing Facility test cell from 20 percent to 12 percent; reduction of Preventive Maintenance (PM) backlog and formation of a permanent multicraft PM team; reduction of turnaround time for Material Requests by 3 days; increase in the number of line items shipped and received per employee by 37 percent and 20 percent respectively; and improvement of customer satisfaction responses from 3.65 to 3.89 of a possible 4.0.

Contact for more information:

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VIII. CONTRACTORS/CONTRACT ADMINISTRATION

180. Contract Consolodation

Ames Research Center

Description of the Activity:

Two contract consolidation efforts were begun in 1987. Three contracts are being consolidated under a Source Evaluation Board procurement now in progress that combines (1) Operation, Maintenance and Repair of Wind Tunnel Facilities and Auxiliaries; (2) Operation, Maintenance and Repair of the Ames High-Pressure Air Systems and Steam Vacuum Systems; and (3) Operation, Maintenance and Repair of the Ames Vertical Gun Range Facility, Ames Aerodynamic Free-Flight Ballistic Range with Counter Flow Shock Tube, Pressurized Ballistic Range and the Electric Arc Shock Tube.

Four administrative support service contracts are being consolidated under a Source Evaluation Board Procurement now in process. The statement of work now includes the following functions: Warehousing, Inventory Control, Equipment Management, Shipping and Receiving; Mail Delivery, Auto Maintenance and Repair; Personnel Service; Word Processing; Public Information, Audiovisual Support for the Public Affairs Office; Library Services; and Technical Manuscript Preparation and Reproduction.

Benefits Achieved:

Contract consolidation efforts reduce administrative burdens/costs by simply decreasing the number of contracts to be solicited, awarded, and managed while maintaining the desired level of support. There are economies of scale benefits as well as elimination of contract management redundancies.

Contact for more information:

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181. Centerwide Microcomputer Hardware Mass Buy Contract

Goddard Space Flight Center (GSFC)

Description of the Activity:

A fixed price, variable quantity, microcomputer hardware mass buy contract was awarded on September 28, 1987, to Win Laboratories, Ltd. The contract provides for the procurement of $2,400,000 of microcomputer hardware over a 2-year period and will provide approximately 570 Intel 80296-based microcomputer systems and peripherals to the Center. The procurement was developed and implemented at an approximate cost to the Government of $27,000, including both procurement and technical personnel resources.

Benefits Achieved:

Using more conventional small purchase procedures, the procurement of equivalent equipment would have required the processing of approximately 129 individual procurement actions at a cost to the Government of approximately $258,000. In addition, an equivalent quantity of equipment would have cost an estimated $3,360,000. The cost savings to the Government totaled approximately $1,191,000 in significant efficiencies in terms of hardware standardization, single vendor responsibility and reduced maintenance costs.

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182. Five-Percent Set-Aside of Contractor's Award Fee for Quality and Productivity Enhancement

Goddard Space Flight Center (GSFC)

Description of the Activity:

For all award-fee contracts being administered within the Engineering Directorate, a clause has been added which allows for 5 percent of the award fee to be determined by the contractor's performance relative to quality and productivity enhancements. During FY 1987, this clause was added to two new award-fee contracts (Fairchild and TRW) for a total of five contracts to date which contain this clause.

Benefits Achieved:

This clause provides a formal mechanism for contractors to receive financial rewards for their productivity accomplishments.

Contact for more information:

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183. Standard "Quality and Productivity Enhancement" Provision in NASA/GSFC Contracts

Goddard Space Flight Center (GSFC)

Description of the Activity:

Since the latter part of 1987, contracting officers, GSFC Productivity Focal Points and procurement officers have been active in attempting to place a productivity provision in contract performance plans for the performance evaluation plan as a part of the award fee evaluation process in new and renegotiated contracts. Currently, there are seven such contracts in being with two of these placed in the reporting period. The standard "provision" follows and serves as "benefits achieved."

Benefits Achieved:

"Quality and Productivity Enhancement." This Performance Evaluation Category will address verifiable contractor accomplishments during the evaluation period that have resulted in improvements in the quality of products or services delivered, or productivity enhancements that have been directly translated into the increased efficiency, effectiveness, or economy of contractor operations. The focus will be on innovative actions initiated by the contractor that resulted in tangible benefits to the Government. The accomplishments reported must meet at least one of the following criteria: (1) conserve money, time, or material; (2) improve procedures, methods, or adminsitrative processes; (3) improve tools, fixtures, or other equipment; (4) economically increase quantity or quality of output; (5) eliminate duplication of efforts; and (6) eliminate or substantially reduce safety hazards.

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184. Request for Proposal Calls for Innovative Productivity Concepts

Johnson Space Center (JSC)

Description of the Activity:

The Space Station Work Package (WP-2) Phase C/D Request for Proposal (RFP) included a requirement that proposers include innovative concepts for productivity improvement in their proposals. These concepts would be in addition to those proposed in accordance with Space Station productivity goals.

Benefits Achieved:

Specific benefits will not be identified until proposals are actually implemented. However, there is an increased awareness of the productivity concept and goals within both the responsible NASA/JSC organization and within the contractor organization that was awarded the contract. It is anticipated that this increased awareness and the eventual implementation of specific contractor proposals will result in decreased costs and increased quality.

Contact for more information:

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185. Security Engineering

Johnson Space Center (JSC)

Description of the Activity:

In October 1986, as a result of a Johnson Space Center (JSC) proposal, the U.S. Air Force (USAF) transferred security engineering tasks associated with automatic data processing

(ADP) to NASA. The tasks transferred relate to ADP system security and configuration control associated with the USAF's Shuttle payload requirements. These tasks are now accomplished on a reimbursable basis.

Benefits Achieved:

Detailed cost information is not available; however, JSC contract cost when compared with USAF contract cost indicates savings in excess of $3 million annually.

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186. Consolidation of Contracts

Langley Research Center (LaRC)

Description of the Activity:

Six separate contracts were consolidated into one service contract for the Facilities Engineering Division (FENG); 16 were consolidated into one service contract for the Atmospheric Sciences Division (ASD).

Benefits Achieved:

Consolidations reduce considerably the workloads of both technical and acquisition personnel, e.g., the time and effort of two (2) contract specialists to solicit and award two contracts and two Technical Representatives of the Contracting Officer (TRCO) versus the time and effort of 22 Contract Specialists and 22 TRCO's.

Contact for more information:

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187. Multiple Source, Multiple Award, Level of Effort, With Options R&D Contracting

Langley Research Center (LaRC)

Description of the Activity:

We are currently using multiple sources, multiple awards, levels of efforts, with option provisions in some of our R&D contracts.

Benefits Achieved:

Use of multiple sources has stimulated competition. Multiple awards, for dual/parallel efforts, can motivate timely work performance to the highest technical level, and provide the capability to cross-reference contractors' work products. Levels of effort, with option provisions, and with work directed by Task Orders provides the greatest

degree of research/funding flexibility and ensures research continuity. The administrative costs (technical and contract administration) with this type of contract are much less than those same associated with several small R&D contracts.

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188. Document Generation System

Lewis Research Center (LeRC)

Description of the Activity:

The Document Generation System is the implementation of a computer-based methodology to assist contract specialists in the creation of solicitations, contracts and modifications. Two modules have been implemented within this system: modifications and amendments. Contract Specialists within the Procurement Division have received training with respect to using the Document Generation System.

Benefits Achieved:

The Document Generation System will provide improved quality, better uniformity, and a reduction of time for production and review of procurement documents. Purchasing Agents within the Purchase Branch have used the Document Generation System 56 out of 59 occasions to effectuate amendments to their procurements. This has meant a more efficient means of processing those actions, a reduction of time spent in processing those actions, and a better quality document.

Contact for more information:

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189. Procurement Improvements

Marshall Space Flight Center (MSFC)

Description of the Activity:

Many improvements in the efficient and effective operation of the procurement process have been made at MSFC. These improvements include the following actions: (1) Monthly unilateral action reports are now automatically created for electronic distribution to key managers within the Center, including the Center Director. Reports cover outstanding and overage change orders, provisioning orders, and claims for selected contracts under major programs/projects. (2) Approval of Master Buy Plan submittals was delegated by the Center Director to the Procurement Officer. (3) Two new alternate methods were developed and implemented for statusing procurement actions to provide easier and more direct input of data. One method is direct on-line statusing of procurement actions by the responsible buyer. Another method provides turnaround labels for each milestone buyer code, and type of procurement action. The labels

eliminate the need for buyers to complete and submit forms to status their actions and also provide a vivid reminder to status actions as they are accomplished. (4) Lists of vendors, rotated by the last date solicited, are automatically generated for selected commodities and/or fields of interest applicable to a given procurement action. Additional available criteria for developing a source list are the number of sources desired, the business size and type, and the city and state. (5) Proposers are furnished a formatted floppy disk on which to submit their cost proposal allowing for extensive use of PCs in the cost evaluation process.

Benefits Achieved:

Benefits of the above initiatives are (1) improved accuracy and timeliness of data distribution for appropriate management action, (2) reduced processing time and delegation authority to the responsible area, (3) reduced paper flow and improved data accuracy with reduced input burden on buyers, (4) ready availability of automated source lists which are rotated as required by the regulations, and (5) reduced process time for Source Evaluation Boards.

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190. Contractor Incentives

NASA Headquarters (Code Q)

Description of the Activity:

The Space Station contractors will have a share of the award fee allocated to the NASA SRM&QA offices for evaluation purposes. This separate identification for SRM&QA evaluation is new and innovative and has not been accomplished on previous programs.

Benefits Achieved:

Prior to this initiative, SRM&QA inputs to the award fee process were merely a sub-set of another area, thus the input was lost in the overall consideration. As a result of the SSQ effort, the contractor SRM&QA organizations will recognize a need to perform as desired or face the possibility of their identification as being responsible for a lower rating. We anticipate that the Space Station contractors will strive for the highest award possible, thus ensuring that the SRM&QA organizations perform as required.

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191. Contracts

NASA Headquarters (Code S)

Description of the Activity:

With the Space Station Program geographically distributed among several NASA sites throughout the country, the coordination of the competitive phase C/D procurement activity for this complex, multi-billion dollar program presented a unique challenge. To provide the coordination necessary to avoid redundancy and maximize consistency while expediting these procurements, which were performed concurrently, the Space Station Program Office established the Program Procurement Coordination Committee (PPCC).

Benefits Achieved:

This committee, with representation from all participating centers, accomplished the difficult task of coordinating and integrating the considerable effort involved in this agency-wide procurement activity. This coordination effort allowed NASA to successfully award all five Phase C/D contracts (with a total value in excess of $5 billion) on schedule and within an unusually short period of time.

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